OPERATING INSTRUCTIONS

For

RADIO TRANSMITTER

MODELS

99A AND 99C

Manufactured By

WILCOX ELECTRIC COMPANY, INC.

KANSAS CITY 27, MISSOURI, U. S. A.

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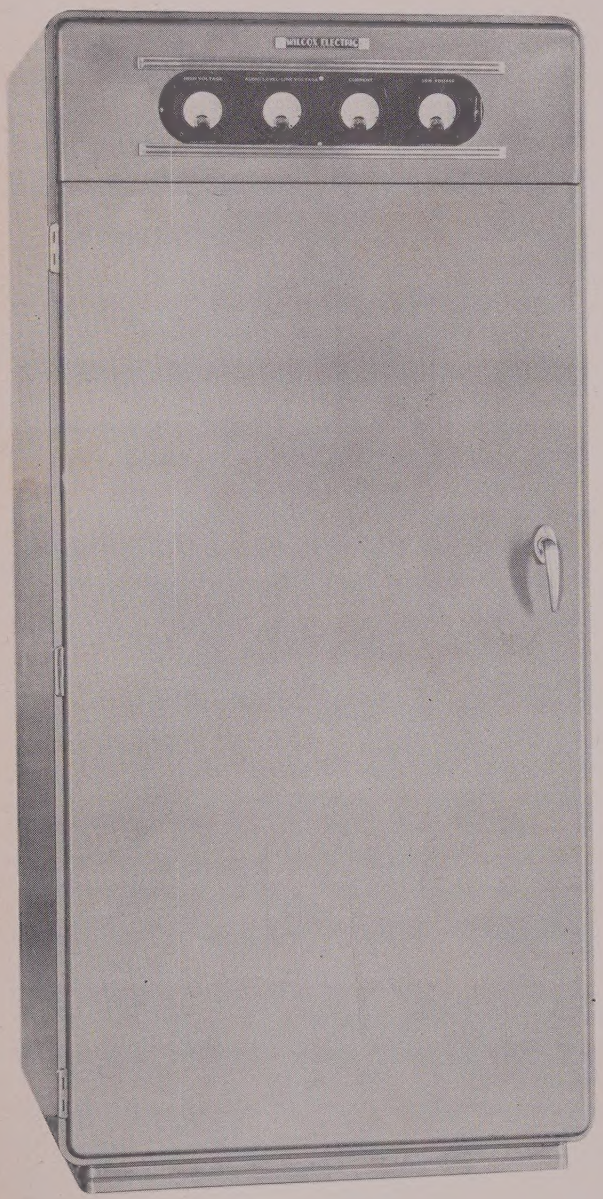
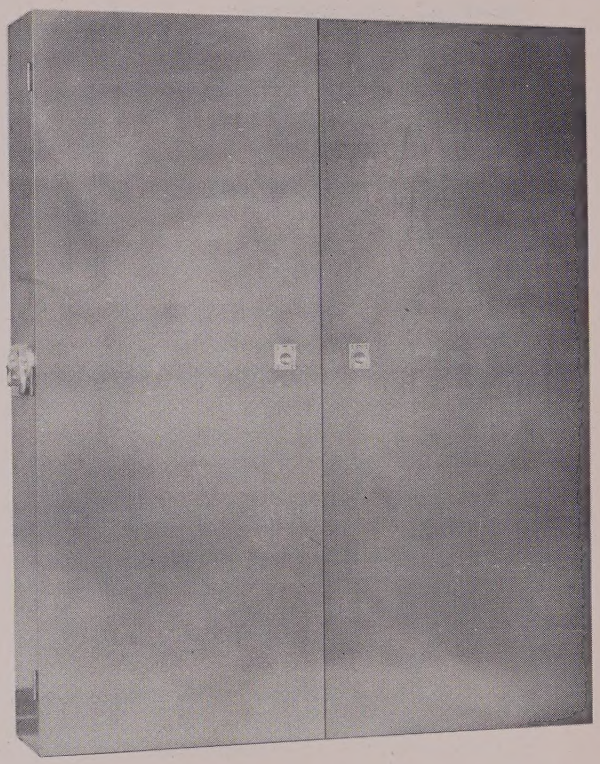


Front View



Coil Storage Cabinet

Figure 1-1. Radio Transmitter Models 99A and 99C

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KANSAS CITY 27, MISSOURI, U. S. A.

SECTION I
GENERAL DESCRIPTION

1-1. GENERAL.

1-2. PURPOSE. The Wilcox Model 99A Radio Transmitter, consisting of equipment listed in Tables I and III, and the Wilcox Model 99C Radio Transmitter, consisting of equipment listed in Tables II and III, are complete self-contained transmitters for point-to-point and ground-to-air communications service. Each is designed to generate 400 watts of carrier power on preselected frequencies within the range of 2 to 20 megacycles. High power output of nominal 400 watts or low power output of nominal 35 watts is provided and selection made with a two position power switch located on the front of the transmitter. Incorporated in the transmitter are four independent r-f units, two independent modulators, and a control system arranged to provide c-w, voice or frequency shift teletypewriter emission on any one of the four r-f channels or simultaneous and unrelated c-w, voice or teletypewriter emission on two of the r-f channels. All of the equipment necessary for local operation of the r-f channels and associated modulators, exclusive of telegraph key, microphone, and teletype equipment, is housed within the transmitter cabinet. (See figure 1-1.)

1-3. APPLICATION OF EQUIPMENT. Radio Transmitter Model 99A or Radio Transmitter Model 99C, and associated antenna system, form a complete fixed field transmitter station. The transmitter may be locally controlled with its self-contained control equipment or remotely controlled over telephone circuits. Several arrangements of telephone circuitry and remote equipment can be used, including the arrangements described in paragraphs 2-15 through 2-51 and in paragraphs 2-65 through 2-84.

1-4. POWER REQUIREMENTS. Radio Transmitter Models 99A and 99C are each designed to operate on 200 to 240 volts ac, single phase, 60-cps, with power consumption ranging from 1.5-kva to 4.7-kva depending on the number of r-f channels used, the type of emission, and the position of the LO-HI POWER switch.

1-5. EQUIPMENT. Tables I and III list equipment pertaining to Radio Transmitter Model 99A. Tables II and III list equipment pertaining to Radio Transmitter Model 99C.

1-6. DESCRIPTION.

1-7. RADIO TRANSMITTER. Figure 1-2 is a front view of Radio Transmitter 99A with main door open to show the four r-f units, the control panels, and safety doors. Figure 1-3 is a similar view of Radio Transmitter 99C. The meter panel, located at the top, includes sufficient instruments to check the operation of each important circuit in the transmitter. Below the meter panel are the

TABLE I. EQUIPMENT SUPPLIED, RADIO TRANSMITTER MODEL 99A

Qty Per Equip.	Name of Unit	Wilcox Type No.	Over-All Dimensions (Inches)	Weight (Pounds)
1	Radio Transmitter 99A	— — —	72.0 x 31.3 x 32.5	1482
4	R-F Unit (Note 1)	95415B	22.8 x 6.9 x 17.6	54
2	Modulator (Note 2)	95479	9.0 x 7.0 x 16.5	29
2	Dialing Unit	168AB2	19.0 x 10.3 x 3.5	12
1	Cabinet Assembly	95587B	72.0 x 31.3 x 32.5	545
1	Rectifier (Note 2)	95340	13.5 x 13.0 x 10.0	42
1	Channel Selection Relay Unit	96458	19.0 x 10.3 x 5.2	15
1	Modulator Control Unit	95570	19.0 x 10.3 x 5.2	23
	Note 1: Over-all dimensions and weight shown include tubes but not coils Note 2: Over-all dimensions and weight shown include tubes			

TABLE II. EQUIPMENT SUPPLIED, RADIO TRANSMITTER MODEL 99C

Qty Per Equip.	Name of Unit	Wilcox Type No.	Over-All Dimensions (Inches)	Weight (Pounds)
1	Radio Transmitter 99C	— — —	72.0 x 31.3 x 32.5	1482
4	R-F Unit (Note 1)	95415C	22.8 x 6.9 x 17.6	54
2	Modulator (Note 2)	95479	9.0 x 7.0 x 16.5	29
2	Dialing Unit	168AB2	19.0 x 10.3 x 3.5	12
1	Cabinet Assembly	95587C	72.0 x 31.3 x 32.5	545
1	Rectifier (Note 2)	95340	13.5 x 13.0 x 10.0	42
1	Channel Selection Relay Unit	96458	19.0 x 10.3 x 5.2	15
1	Modulator Control Unit	95570	19.0 x 10.3 x 5.2	23
	Note 1: Over-all dimensions and weight shown include tubes but not coils Note 2: Over-all dimensions and weight shown include tubes			

TABLE III. COILS AND ACCESSORIES SUPPLIED, RADIO TRANSMITTER MODELS 99A AND 99C

Qty Per Equip.	Name of Unit	Wilcox Part No.	Over-All Dimensions (Inches)	Weight (Pounds)
1	Storage Cabinet	83137	40.5 x 32.1 x 6.5	56.0
	Third Amp. Plate Coils:			
4	Coil, 2.0 - 2.5 mc	41945	4¼ lg x 1⅞ diam.	0.5
4	Coil, 2.5 - 3.2 mc	41722A	4¼ lg x 1⅞ diam.	0.5
4	Coil, 3.2 - 4.5 mc	41778A	4¼ lg x 1⅞ diam.	0.5
4	Coil, 4.5 - 8.4 mc	41721A	4¼ lg x 1⅞ diam.	0.5
4	Coil, 8.4 - 12.5 mc	41720A	4¼ lg x 1⅞ diam.	0.5
4	Coil, 12.5 - 15.0 mc	41719A	4¼ lg x 1⅞ diam.	0.5
4	Coil, 15.0 - 16.8 mc	41718	4¼ lg x 1⅞ diam.	0.5
4	Coil, 16.8 - 20.0 mc	41944	4¼ lg x 1⅞ diam.	0.5
	Final Amp. Plate Coils:			
4	Coil, 2.0 - 2.5 mc	41726	5 lg x 2⅝ diam.	1.25
4	Coil, 2.5 - 7.5 mc	41731	5 lg x 2⅝ diam.	1.25
4	Coil, 7.5 - 11.6 mc	41730	5 lg x 2⅝ diam.	1.25
4	Coil, 11.6 - 20.0 mc	41729A	5 lg x 2⅝ diam.	1.25
	Antenna Coils:			
4	Coil, 2.0 - 3.0 mc	41933	4⅝ x 4½ x 1¾	0.8
4	Coil, 3.0 - 6.0 mc	41942	4⅝ x 4½ x 1¾	0.8
4	Coil, 6.0 - 10.0 mc	41934	4⅝ x 4½ x 1¾	0.8
4	Coil, 10.0 - 20.0 mc	41943	4⅝ x 4½ x 1¾	0.8
	R-F Choke Coils:			
8	Choke, 2.0 - 4.0 mc	38528	3¼ lg x 13/16 diam.	0.25
8	Choke, 4.0 - 7.5 mc	38530	3¼ lg x 13/16 diam.	0.25
8	Choke, 7.5 - 13.0 mc	38532	3¼ lg x 13/16 diam.	0.25
8	Choke, 13.0 - 20.0 mc	38534	3¼ lg x 13/16 diam.	0.25
1	Test Cable	32934	99.0 long	2.25
2	Interlock Shorting Plug	95606	6.5 x 5.2 x 3.0	1.0

control panels for the four r-f units. All tuning controls are brought out to these panels or are accessible through the door on the left side of each panel. Each of the four knobs below the r-f units is connected to a lever which actuates a locking mechanism at the rear of each r-f unit compartment, facilitating removal of the complete r-f assembly for maintenance or service operations. The main control panel at the center of the transmitter, and the auxiliary control panel below it, include all of the controls necessary for local operation and test of the transmitter. The door at the left of the main control panel covers the relay compartment and the door at the right covers the fuse panel. The wide door, on which the auxiliary control panel is mounted, permits access to the dialing units, modulator control unit, channel control relay unit and the main terminal board. The bottom panel, which is attached with several screws, provides access to the high voltage plate transformers and filter circuits.

1-8. Figure 3-2 is a rear view of Radio Transmitter Models 99A and 99C showing the removable back panel which allows full access to the components within the cabinet. The large air filter connects with two blowers inside the cabinet to provide the necessary air cooling. All electrical connections are made to the transmitter through the rectangular plate at the bottom-left of the cabinet or through an opening in the bottom of the cabinet.

1.9 R-F UNITS. Four r-f units are used in each transmitter. (See figure 1-4). Each r-f unit is a complete radio-frequency channel, exclusive of power supplies, modulator, and control equipment, and is designed for an output of either 400 watts or 35 watts on c-w, voice, or FSK teletype on any frequency within its range of 2 to 20 megacycles. All electrical connections, power supplies, metering, and air cooling are provided by the associated equipment and cabinet assembly of Radio Transmitter Model 99A and Model 99C. Since the r-f unit operates in a compartment in the transmitter cabinet, it is designed without mechanical protection or electrical shielding at the sides of the unit. When removed from cabinet compartment, all circuit elements of the r-f unit are conveniently available for preventive maintenance or service operations.

1-10. Incorporated in each r-f unit are the crystal oscillator, FSK teletype relay, the keying control circuit, the bias isolator tube, the bias protection relay, the overload and underload relays, the channel control relay, and the filament transformers. R-F circuitry consists of a crystal oscillator and three multiplier-amplifier stages followed by a final power amplifier. Switching from crystal control to FSK teletype is accomplished by means of a relay in the grid circuit of the oscillator stage.

1-11. MODULATOR UNIT TYPE 95479. Two Type 95479 Modulators are used in Radio Transmitter Models 99A and 99C. (See figure 1-5). Each modulator is designed to deliver a maximum of 350 watts output for plate modulation of a 400 watt r-f channel with an audio input level of from -30 to O-db (O-db=0.006 watt.) Modulator Type 95479 may be operated from a remote

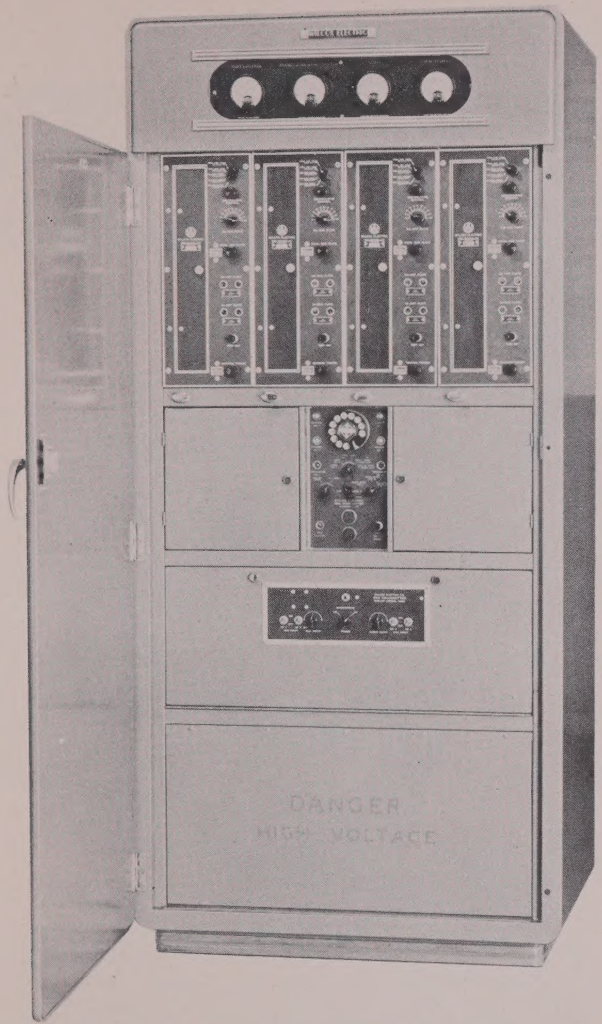

Figure 1-2. Radio Transmitter Model 99A, Front View with Main Door Open

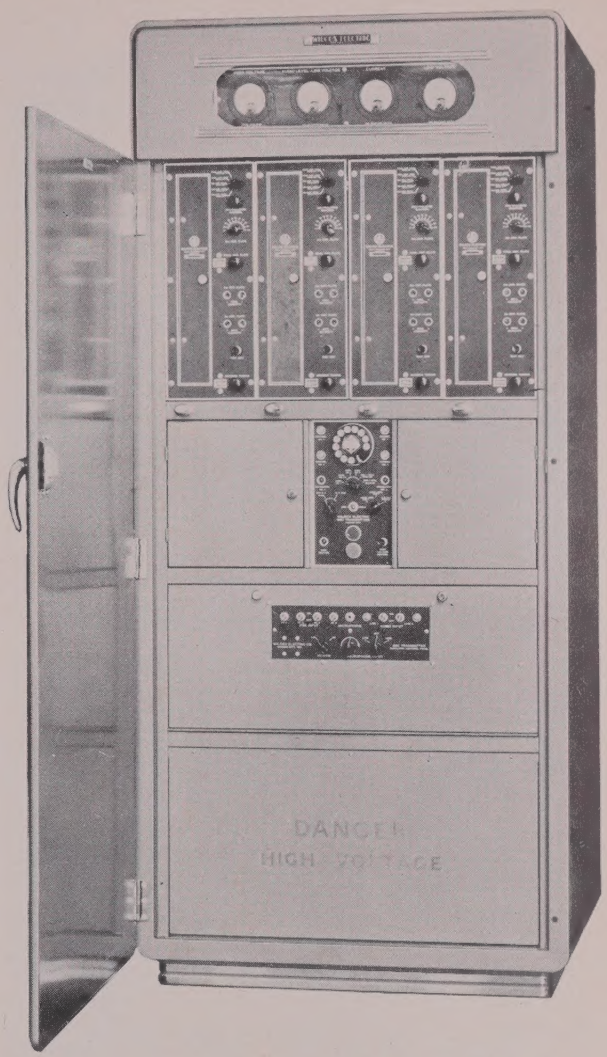

Figure 1-3. Radio Transmitter Model 99C, Front View with Main Door Open

control point over a telephone circuit or locally with a carbon-button microphone.

1-12. Three audio amplifier stages, followed by a class B power amplifier, are incorporated in the modulator. All amplifier stages utilize push-pull triodes or triode-connected tubes to minimize harmonic distortion. The modulation transformer for each of the two modulators used in the transmitter and part of the control and metering circuits are mounted separately within the cabinet.

1-13. RECTIFIER UNIT TYPE 95340. One Type 95340 Rectifier Unit is used in each radio transmitter. (See figure 1-6.) It contains the rectifier tubes and filament transformers for a 2,500-volt, a 1,000-volt and a 600-volt plate supply and the complete equipment for grid bias supply. The associated plate supply transformers and filter components are mounted separately within the cabinet. Rectifier Unit Type 95340 is designed to supply power for all the plate and bias requirements of the four r-f units and the two modulators used in Radio Transmitter Models 99A and 99C.

1-14. DIALING UNIT TYPE 168AB2. Two Type 168AB2 Dialing Units are used in each transmitter. (See figure 1-7.) Unit No. 1 controls the selection and operation of R-F Units No.'s 1 and 2 and Modulator Unit No. 1. Dialing Unit No. 2 controls the selection and operation of R-F Units No's 3 and 4 and Modulator Unit No. 2. Sixty cycle pulses from the remote control equipment or from the local dialing equipment actuate a multiple position minor switch in each dialing unit which in turn operates other relays in the transmitter to bring up the desired channel or channels for c-w or phone operation. In addition, the dialing units also control the start-stop functions of the transmitter.

1-15. MODULATOR CONTROL UNIT TYPE 95570. One Modulator Control Unit Type 95570 is used in each transmitter. (See figure 1-8.) The unit consists of a group of relays for controlling the modulators and the start-stop functions of the transmitter, two line isolation transformers for simplexing the d-c keying signals over

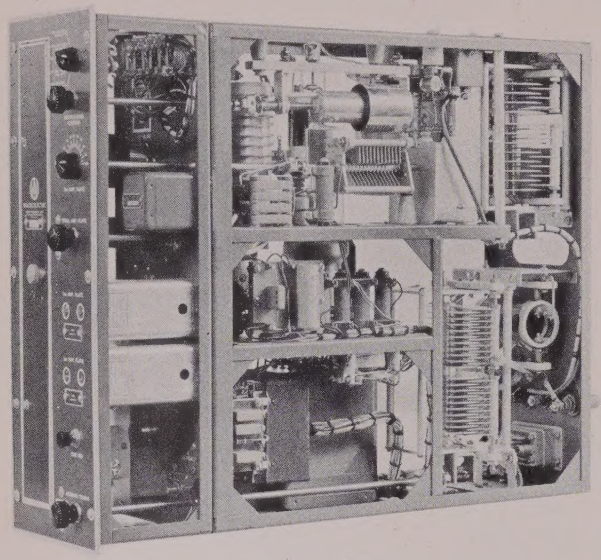

Figure 1-4. R-F Unit, Type 95415B and Type 95415C

the same telephone line used for the audio signals, and a local dialing transformer.

1-16. CHANNEL SELECTION RELAY UNIT TYPE 96458. One Channel Selection Relay Unit Type 96458 is used in each transmitter. (See figure 1-9.) The unit includes three high voltage switching relays and four channel selector relays. One high voltage switching relay and two channel selector relays are used to control R-F Units No's 1 and 2, and Modulator Unit No. 1, for either c-w or phone operation. Similarly the second high voltage relay and the second pair of channel selector relays control R-F Units No's 3 and 4, and Modulator Unit No. 2, for c-w or phone operation. The third high voltage relay is the main power selector relay, applying either low or high power to the selected R-F Unit.

1-17. COILS. A complete set of coils and r-f chokes, covering the frequency range of from 2 to 20 megacycles and listed in Table III, is supplied for each of the four r-f units in the transmitter. Unused coils and chokes are stored in the coil cabinet shown in figure 1-11.

1-18. TEST CABLE. (See figure 1-10.) The 8-foot test cable supplied with each transmitter permits removal and bench test of any one of the four r-f units. The r-f unit to be bench tested is removed from its compartment in the transmitter cabinet and connected, by the test cable, to the power connector at the rear of the cabinet compartment.

1-19. INTERLOCK SHORTING PLUG. (See figure 1-10.) In the event of failure of one of the r-f units, the defective unit can be removed for repair without disrupting operation of the remaining r-f units in the transmitter. The interlock shorting plug is used to close the interlock circuit in the vacant compartment from which the defective r-f unit is removed.

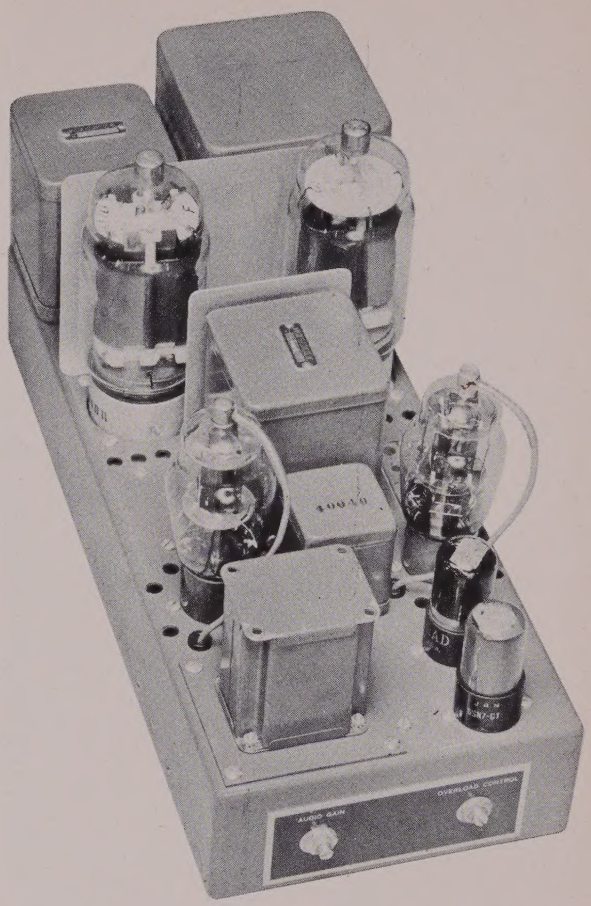

Figure 1-5. Modulator Unit Type 95479

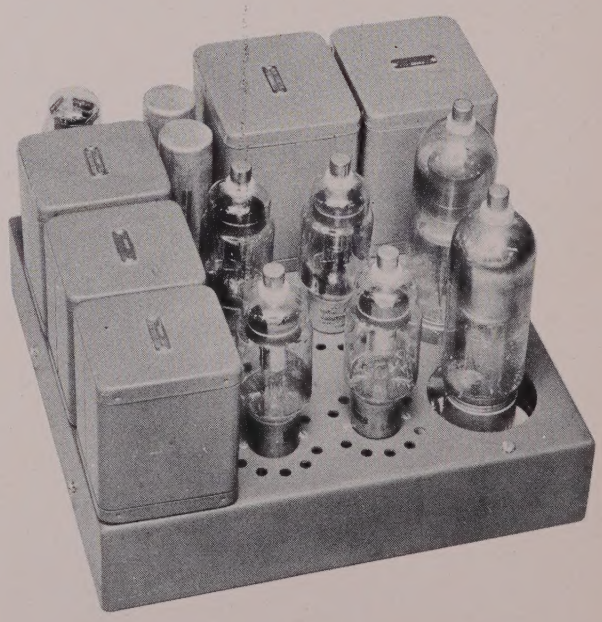

Figure 1-6. Rectifier Unit Type 95340

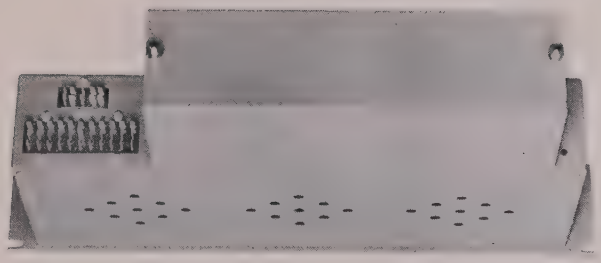

Figure 1-7. Dialing Unit Type 168AB2

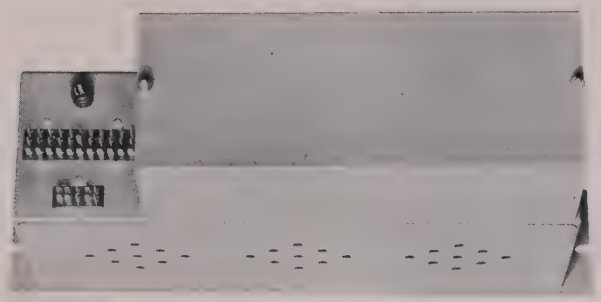

Figure 1-8. Modulator Control Unit Type 95570

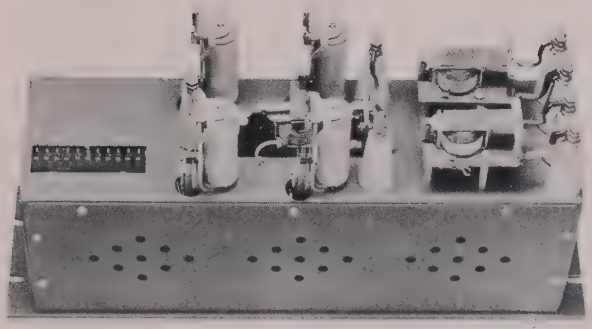

Figure 1-9. Channel Selection Relay Unit Type 96458

Figure 1-10. Test Cable and Interlock Plug

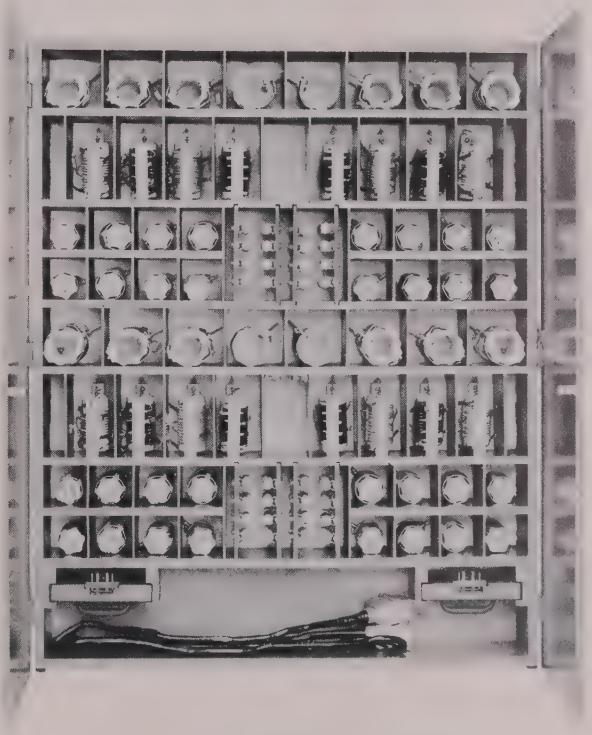

Figure 1-11. Coil Cabinet with Doors Open

SECTION II
OPERATING PROCEDURES

2-1. FUNCTION. Radio Transmitter Models 99A and 99C are complete self-contained transmitters incorporating four independent r-f units, two independent modulators and a control system arranged to provide c-w, voice, or teletype emission on four preselected frequencies within the range of 2 to 20 megacycles. High power output of nominal 400 watts or low power output of nominal 35 watts is provided and selection made with a two position power switch located on the front of the transmitter. Each transmitter can be remotely controlled over a telephone circuit or locally controlled with its self-contained control equipment. The various functions within these operating classifications are defined and described individually in subsequent paragraphs.

Note

Operating procedures are given in sequence for each phase of operation and for each of the two models of transmitting equipment. Paragraphs 2-2 through 2-51 are applicable only to Radio Transmitter Model 99A. Operating procedures pertinent to Radio Transmitter Model 99C are described in paragraphs 2-52 through 2-84. Typical current and voltage readings for both models are given in Table VII and Table VIII.

2-2. SEQUENCE OF OPERATION, RADIO TRANSMITTER MODEL 99A.

2-3. LOCAL CONTROL.

2-4. STARTING AND STOPPING THE EQUIPMENT.

2-5. STARTING. (See figure 2-1.)

a. Close the main a-c line switch. This switch is not incorporated in or supplied with the transmitter. A suitable switch should be installed in the main a-c line in some location near the transmitter.

b. Press the HIGH VOLTAGE CONTROL button. Red pilot lamp designated HIGH VOLTAGE lights and the equipment is in readiness for the various functions described in paragraphs 2-7 through 2-12.

2-6. STOPPING. (See figure 2-1.)

a. Pull out the HIGH VOLTAGE CONTROL button. Red HIGH VOLTAGE pilot lamp goes out.

b. If the transmitter is to be out of service for a lengthy period, open the main a-c line switch.

2-7. HIGH POWER VOICE EMISSION. (See figures 2-1, 2-2, and 2-3.)

a. Turn the two position POWER switch to the HI position.

b. Turn the two position line selector switch, designated LINE 1—LINE 2 in figure 2-1, to the position shown in Table IV corresponding with the voice channel desired.

c. Turn the six position CURRENT switch to the MOD. (1 or 2) TOTAL position shown in Table IV corresponding with the voice channel desired.

d. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack.

e. Dial number 9. Wait 30-seconds for the time delay relay to operate.

f. Dial the number shown in Table IV corresponding with the voice channel desired. The white pilot lamp, for the selected channel, lights.

g. Press the switch button on microphone handle. The red pilot lamp, corresponding with the modulator in use, lights. Speak into the microphone in a normal manner and observe the CURRENT meter. Adjust the MIC. INPUT control to the point where normal speech produces current peaks of maximum 300-ma.

h. Release the channel, when transmission is ended, by dialing 10. The red HIGH VOLTAGE pilot lamp will remain lighted.

2-8. LOW POWER VOICE EMISSION. (See figures 2-1, 2-2, and 2-3.)

a. Turn the two position POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-7.

c. Dial the number shown in Table IV corresponding with the voice channel desired. The white pilot lamp, for the selected channel, and the red pilot lamp which indicates the modulator in use, now light.

d. Press the switch button on microphone handle and speak into the microphone in a normal manner. While speaking, observe the CURRENT meter. Adjust the MIC. INPUT control to the point where normal speech produces current peaks of maximum 80-ma.

e. Release the channel, when transmission is ended, by dialing 10. The red HIGH VOLTAGE pilot lamp will remain lighted.

2-9. HIGH POWER C-W EMISSION. (See figures 2-1, 2-2, and 2-5.)

a. Refer to figure 2-5 which shows the simplest method of keying the transmitter locally.

b. Insert the plug at the end of the key cable in the jack corresponding with the c-w channel desired.

c. Turn the two position POWER switch to the HI position.

d. Turn the two position line selector switch, designated LINE 1—LINE 2, to the position shown in Table IV corresponding with the c-w channel desired.

e. Dial number 9 and wait 30-seconds for the time delay relay to operate.

f. Dial the number shown in Table IV corresponding with the c-w channel desired. The white pilot lamp, for the selected channel, now lights.

g. Transmit the telegraph message.

h. Release the channel by dialing number 10.

2-10. LOW POWER C-W EMISSION. (See figures 2-1, 2-2, and 2-5.)

a. Perform operations a and b, paragraph 2-9.

b. Turn the two position POWER switch to the LO position.

c. Perform operations d through h, paragraph 2-9.

2-11. HIGH POWER TELETYPE EMISSION. (See figures 2-1 and 2-2.)

a. Turn the two position POWER switch to the HI position.

b. Turn the two position line selector switch, designated LINE 1—LINE 2, to the position shown in Table IV corresponding with the teletype channel desired.

c. Lift the FSK INPUT toggle switch, shown in Table IV and corresponding with the desired r-f channel, to the ON position.

d. Dial number 9 and wait 30-seconds for the time delay relay to operate.

e. Dial the number shown in Table IV corresponding with the teletype channel desired. The white pilot lamp, for the selected channel, now lights.

f. Transmit the teletype message.

g. Release the channel by dialing number 10.

2-12. LOW POWER TELETYPE EMISSION. (See figures 2-1 and 2-2.)

a. Turn the two position POWER switch to the LO position.

b. Perform operations b through g, paragraph 2-11.

2-13. REMOTE CONTROL, C-W AND VOICE.

Note

The remote control arrangements covered in paragraphs 2-15 through 2-30 depend upon the simplex control system in which the d-c carrier control voltage is obtained by grounding the simplex circuit of the channel control line(s) at the remote control position.

2-14. PREPARATORY ACTION AT THE TRANSMITTER STATION. (See figure 2-1.)

a. Close the main a-c line switch.

b. Press the HIGH VOLTAGE CONTROL button.

2-15. REMOTE CONTROL OVER ONE TELEPHONE LINE. (See figure 2-6.)

2-16. STARTING AND STOPPING THE EQUIPMENT.

2-17. STARTING.

a. Turn on the remote control equipment.

b. Dial 9 and wait 30 seconds for the transmitter tubes to warm up.

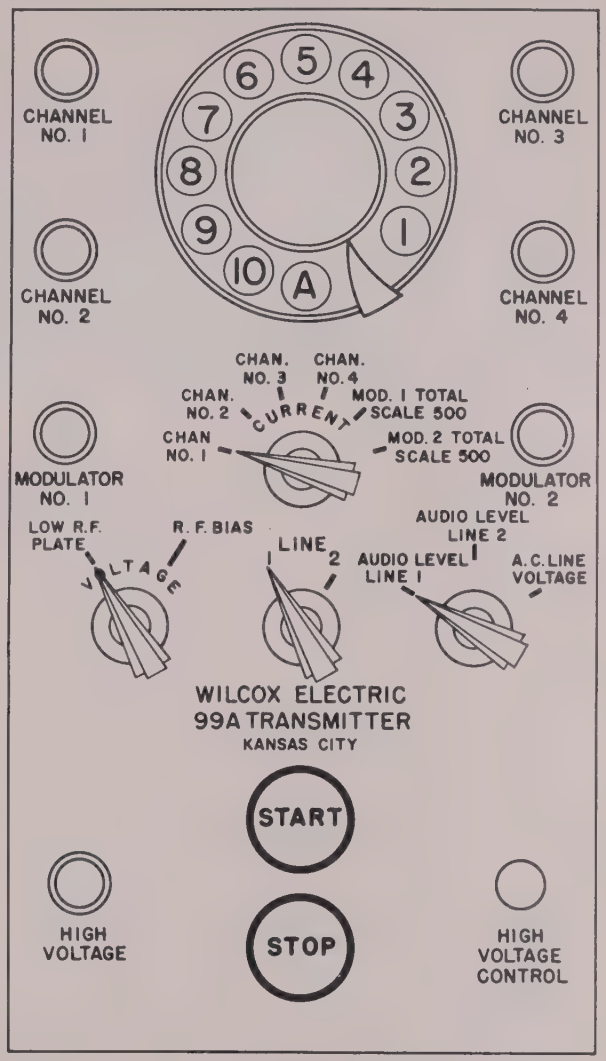

Figure 2-1. Main Control Panel, Radio Transmitter Model 99A

2-18. STOPPING.

a. Dial number 10.

b. If operation is to be discontinued for a lengthy period, turn off the remote control equipment.

2-19. HIGH POWER VOICE EMISSION.

a. Select the transmission channel desired.

b. Instruct the operator at the transmitter station to turn the two position POWER switch to the HI position and to turn the two position line selector switch, designated LINE 1—LINE 2, to the position shown in Table IV corresponding with the desired channel.

Note

Channels 1 and 2 are controllable when the transmitter line selector switch is turned to the LINE 1 position. Channels 3 and 4 are controllable when the selector switch is turned to the LINE 2 position. Remote control of each

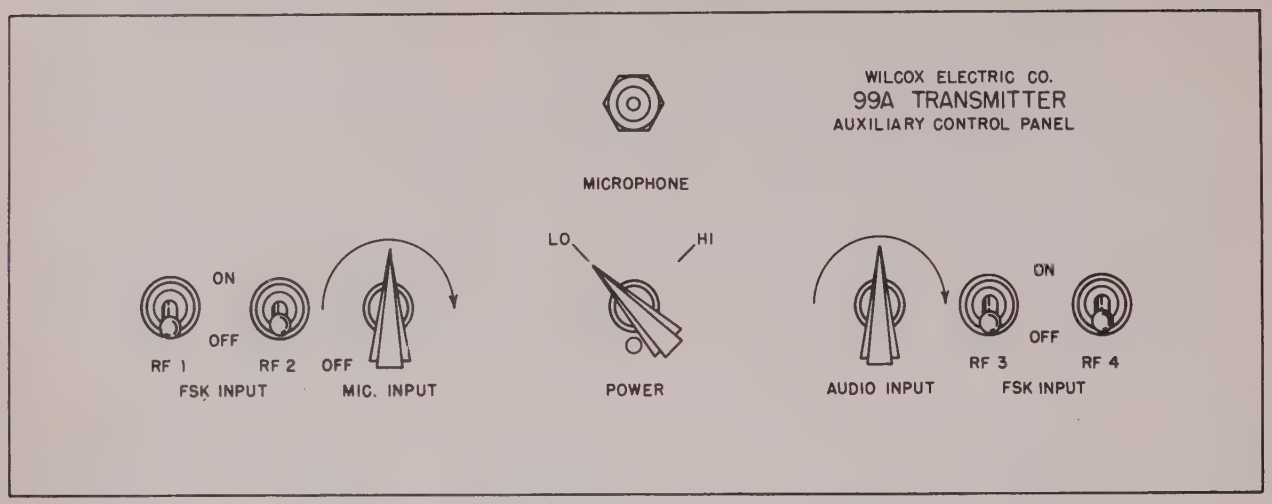

Figure 2-2. Auxiliary Control Panel, Radio Transmitter Model 99A

of the four channels, over one telephone line, is achieved by instructions from the remote control operator to the transmitter operator to switch the line to the desired channel.

c. Dial number 9. Wait 30 seconds for transmitter tubes to warm up.

d. Dial the number shown in Table IV corresponding with the channel desired.

e. Press the microphone switch and speak into the microphone at normal voice level.

f. Release the channel, when transmission is ended, by dialing 10.

2-20. LOW POWER VOICE EMISSION.

a. Select the transmission channel desired.

b. Instruct the transmitter operator to turn the two position POWER switch to the LO position and to turn the two position line selector switch to either LINE 1 or LINE 2 as determined by the channel to be used and shown in Table IV. (See note in paragraph 2-19.)

c. Repeat steps c through f, paragraph 2-19.

2-21. HIGH POWER C-W EMISSION.

a. Repeat steps a through d, paragraph 2-19.

b. Manipulate the telegraph key.

c. Release the channel, when transmission is ended, by dialing 10.

2-22. LOW POWER C-W EMISSION.

a. Perform operations a and b, paragraph 2-20.

b. Dial 9 and wait 30 seconds for transmitter tubes to warm up.

c. Dial the number shown in Table IV corresponding with the channel desired.

d. Manipulate the telegraph key.

e. Release the channel, when transmission is ended, by dialing 10.

2-23. REMOTE CONTROL OVER TWO TELEPHONE LINES. (See figure 2-7.)

2-24. STARTING AND STOPPING THE EQUIPMENT.

2-25. STARTING.

a. Perform operations a and b, paragraph 2-14.

b. Turn on the remote control equipment.

c. Dial 9 on telephone dial A (See figure 2-7) if operation on transmitter channels 1 or 2 is desired. Dial 9 on telephone dial B if operation on transmitter channels 3 or 4 is desired. After dialing, wait 30-seconds for the transmitter tubes to warm up.

2-26. STOPPING.

a. Use the same dial previously used to start the equipment and dial 10.

b. If operation is to be discontinued for a lengthy period, turn off the remote control equipment.

2-27. HIGH POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-2.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and microphone A shown in figure 2-7. Channels 3 and 4 are controlled with dial B and microphone B.

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table IV.

d. Press the microphone switch and speak into the microphone at normal voice level.

e. Release the channel, when transmission is ended, by dialing 10. (See notes below.)

Note

Two operators are frequently assigned to the remote control station equipped with two telephone control lines. One operator, at control

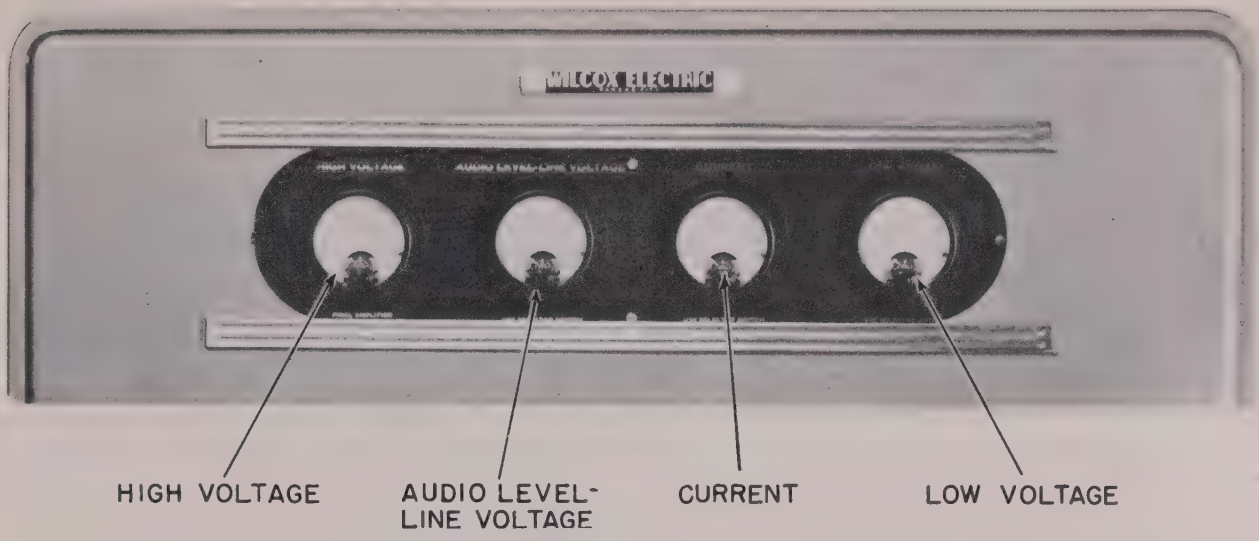

Figure 2-3. Meter Panel, Radio Transmitter Models 99A and 99C

position A, can control transmitter channels 1 or 2 with dial A and microphone A or key A. (See figure 2-7.) Simultaneously, the second operator at control position B can control transmitter channels 3 or 4 with dial B and microphone B or key B.

Note

When two transmitter channels are used simultaneously, the operator who first completes transmission should release his channel by dialing number 5-6-7 or 8. Number 10 should not be dialed until both operators conclude transmission and desire to stop the transmitter. Premature dialing of number 10, although non-injurious to the equipment, will deprive the second operator of his channel and delay transmission until the transmitter is again started and the channel energized.

2-28. LOW POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the LO position. (See figure 2-2.)

b. Perform operations b through e, paragraph 2-27. Read the three notes in that paragraph.

2-29. HIGH POWER C-W EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-2.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and key A shown in figure 2-7. Channels 3 and 4 are controlled with dial B and key B.

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table IV.

d. Manipulate the telegraph key.

e. Release the channel, when transmission is ended, by dialing 10. (See notes immediately preceding paragraph 2-28.)

2-30. LOW POWER C-W EMISSION.

a. Instruct the operator at the transmitter to turn the transmitter POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-29.

2-31. REMOTE CONTROL WITH TONE KEYING. (See figures 2-8 and 2-9.)

Note

The remote control arrangements covered in paragraphs 2-32 through 2-47 depend upon tone keying in which carrier control voltage is obtained from a tone signal, applied at the remote control point and conducted over telephone control lines, which actuates the carrier control relay in the desired r-f channel. The basic system is shown in figures 2-8 and 2-9.

2-32. REMOTE CONTROL WITH TONE KEYING OVER FIVE TELEPHONE LINES. (See figure 2-8.)

2-33. STARTING AND STOPPING THE EQUIPMENT.

2-34. STARTING.

a. Perform operations a and b, paragraph 2-14.

b. Perform operations a and b, paragraph 2-17.

2-35. STOPPING.

a. Dial 10.

b. If operation is to be discontinued for a lengthy period, turn off the remote control equipment.

2-36. HIGH POWER VOICE EMISSION.

a. Perform operations a through f, paragraph 2-19.

TABLE IV. TRANSMITTER DIAL FUNCTIONS, RADIO TRANSMITTER MODEL 99A

Dial No.	Emission	R-f Channel	Line Switch Position (Figure 2-1)	CURRENT Switch Position (Figure 2-1)	FSK INPUT Switch ON (Figure 2-2)
1	C-W	1	LINE 1	—	—
1	Teletype	1	LINE 1	—	R-F 1
2	Voice	1	LINE 1	MOD. 1 TOTAL	—
3	C-W	2	LINE 1	—	—
3	Teletype	2	LINE 1	—	R-F 2
4	Voice	2	LINE 1	MOD. 1 TOTAL	
1	C-W	3	LINE 2	—	—
1	Teletype	3	LINE 2	—	R-F 3
2	Voice	3	LINE 2	MOD. 2 TOTAL	—
3	C-W	4	LINE 2	—	—
3	Teletype	4	LINE 2	—	R-F 4
4	Voice	4	LINE 2	MOD. 2 TOTAL	—
5, 6, 7, 8	Channel Release. See note preceding paragraph 2-28.				
9	Start				
10	Stop				

b. Release the channel, when transmission is ended, by dialing 10.

2-37. LOW POWER VOICE EMISSION.

a. Perform operations a and b, paragraph 2-20.

b. Perform operations c through f, paragraph 2-19.

2-38. HIGH POWER C-W EMISSION.

a. Perform operations a through d, paragraph 2-19.

b. Perform operations b and c, paragraph 2-21.

2-39. LOW POWER C-W EMISSION.

a. Perform operations a and b, paragraph 2-20.

b. Perform operations b through e, paragraph 2-22.

2-40. REMOTE CONTROL WITH TONE KEYING OVER SIX TELEPHONE LINES. (See figure 2-9.)

2-41. STARTING AND STOPPING THE EQUIPMENT.

2-42. STARTING. Perform all operations, paragraphs 2-14 and 2-17.

2-43. STOPPING. Perform all operations, paragraph 2-18.

2-44. HIGH POWER VOICE EMISSION. Perform all operations, paragraph 2-27. Read the three notes in that paragraph.

2-45. LOW POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-27. Read the three notes in that paragraph.

2-46. HIGH POWER C-W EMISSION. Perform all operations, paragraph 2-29.

2-47. LOW POWER C-W EMISSION.

a. Instruct the transmitter operator to turn the POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-29. Read the note in that paragraph.

2-48. REMOTE CONTROL, TELETYPE. (See figure 2-10.)

Note

Figure 2-10 shows a typical remote teletype installation in which two teletypewriters are used at the remote control point to actuate related FSK oscillators at the transmitter. As indicated, a separate telephone line is required for each teletype circuit. Transmitter control circuits, shown in figure 2-10, are otherwise identical to the two line system described in paragraphs 2-23 through 2-30.

2-49. PREPARATORY ACTION AT THE TRANSMITTER STATION. (See figures 2-1 and 2-10.)

a. Connect the FSK oscillators to the desired r-f channels.

b. Close the main a-c line switch.

c. Press the HIGH VOLTAGE CONTROL button.

2-50. HIGH POWER TELETYPE EMISSION.

a. Select the desired teletype channel.

b. Instruct the operator at the transmitter to turn the POWER switch to the HI position, and to lift the FSK INPUT toggle switch, corresponding with the desired r-f channel, to the ON position.

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and teletypewriter A shown in figure 2-10. Channels 3 and 4 are controlled with dial B and teletypewriter B.

c. Use the proper telephone dial and dial 9. Wait 30 seconds for the transmitter tubes to warm up.

Figure 2-4. Circuit Selector Switch, Radio Transmitter Models 99A and 99C

d. Dial the number of the desired teletype channel.

e. Transmit the teletype message.

f. Release the channel, when transmission is ended, by dialing 10.

2-51. LOW POWER TELETYPE EMISSION.

a. Select the desired teletype channel.

b. Instruct the operator at the transmitter to turn the POWER switch to the LO position, and to lift the FSK INPUT toggle switch, corresponding with the desired r-f channel, to the ON position.

c. Perform operations c through f, paragraph 2-50.

Note

Read the notes immediately following operation e in paragraph 2-27. Two teletype operators can be similarly assigned to the remote control station if the station is arranged as shown in figure 2-10.

2-52. SEQUENCE OF OPERATION, RADIO TRANSMITTER MODEL 99C.

2-53. LOCAL CONTROL.

2-54. STARTING AND STOPPING THE EQUIPMENT.

2-55. STARTING. (See figure 2-11.)

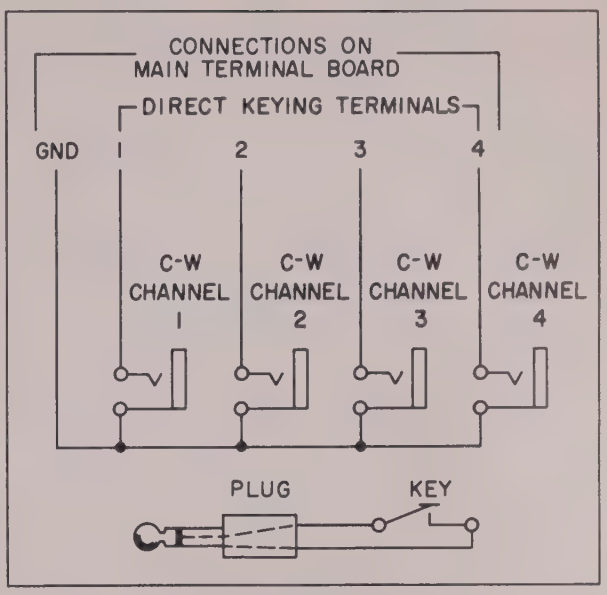

Figure 2-5. Keying Cable Assembly, Radio Transmitter Model 99A

a. Close the main a-c line switch. This switch is not incorporated in or supplied with the transmitter. A suitable switch should be installed in the main a-c line in some location near the transmitter.

b. Press the HIGH VOLTAGE CONTROL button. Red pilot lamp designated HIGH VOLTAGE lights and the equipment is in readiness for the various functions described in paragraphs 2-57 through 2-62.

2-56. STOPPING. (See figure 2-11.)

a. Pull out the HIGH VOLTAGE CONTROL button. Red HIGH VOLTAGE pilot lamp goes out.

b. If the transmitter is to be out of service for a lengthy period, open the main a-c line switch.

2-57. HIGH POWER VOICE EMISSION. (See figures 2-3, 2-11, and 2-12.)

a. Turn the two position POWER switch to the HI position.

b. Refer to figure 2-11 and place the two position toggle switch, designated LINE 1—LINE 2, in the position shown in Table V corresponding with the voice channel desired.

c. Refer to figure 2-12 and turn the three position MICROPHONE INPUT switch to the same line position selected in step b above.

d. If the switches used in steps b and c are in the LINE 1 position, refer to figure 2-12 and place the AUDIO INPUT switch for LINE 1 in the OFF position. If LINE 2 is used, place the AUDIO INPUT switch for LINE 2 in the OFF position.

e. Refer to figure 2-11 and turn the six position CURRENT switch to the MOD. (1 or 2) TOTAL position shown in Table V corresponding with the voice channel desired.

f. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack.

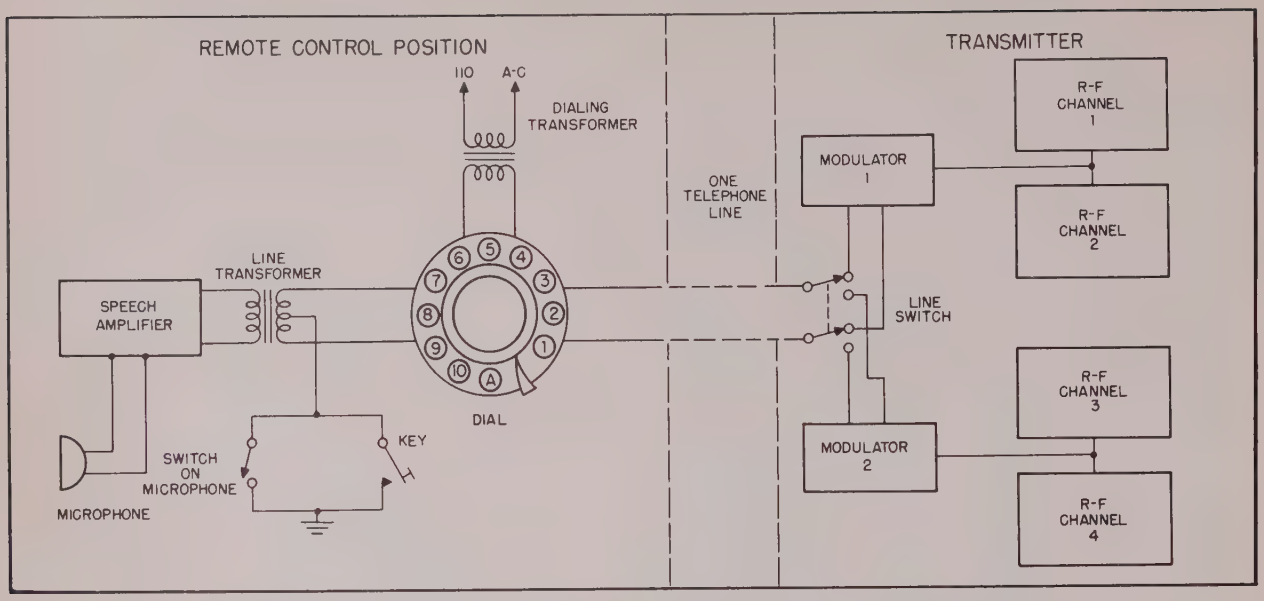

Figure 2-6. Remote Control with One Telephone Line, Radio Transmitter Model 99A

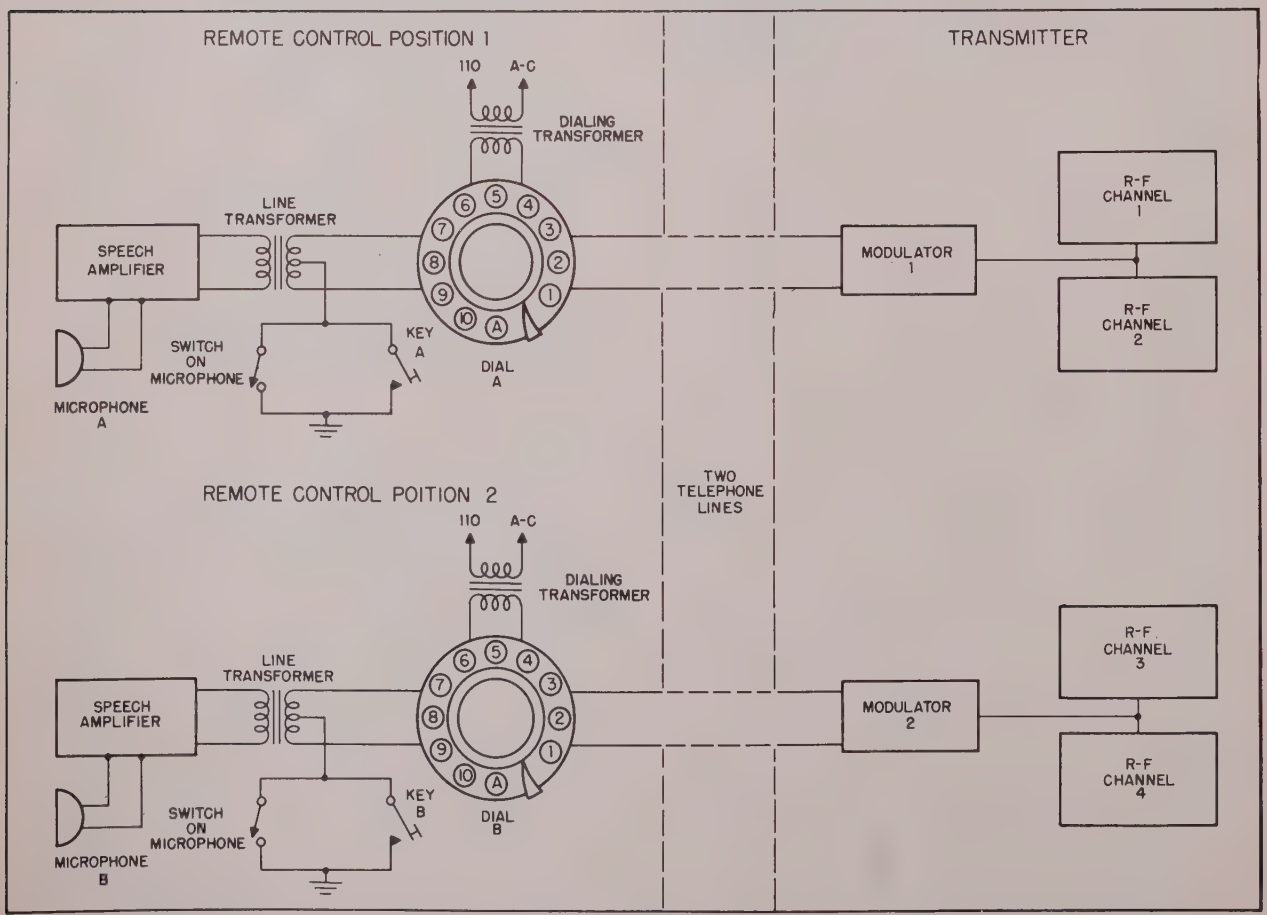

Figure 2-7. Remote Control with Two Telephone Lines, Radio Transmitter Models 99A and 99C

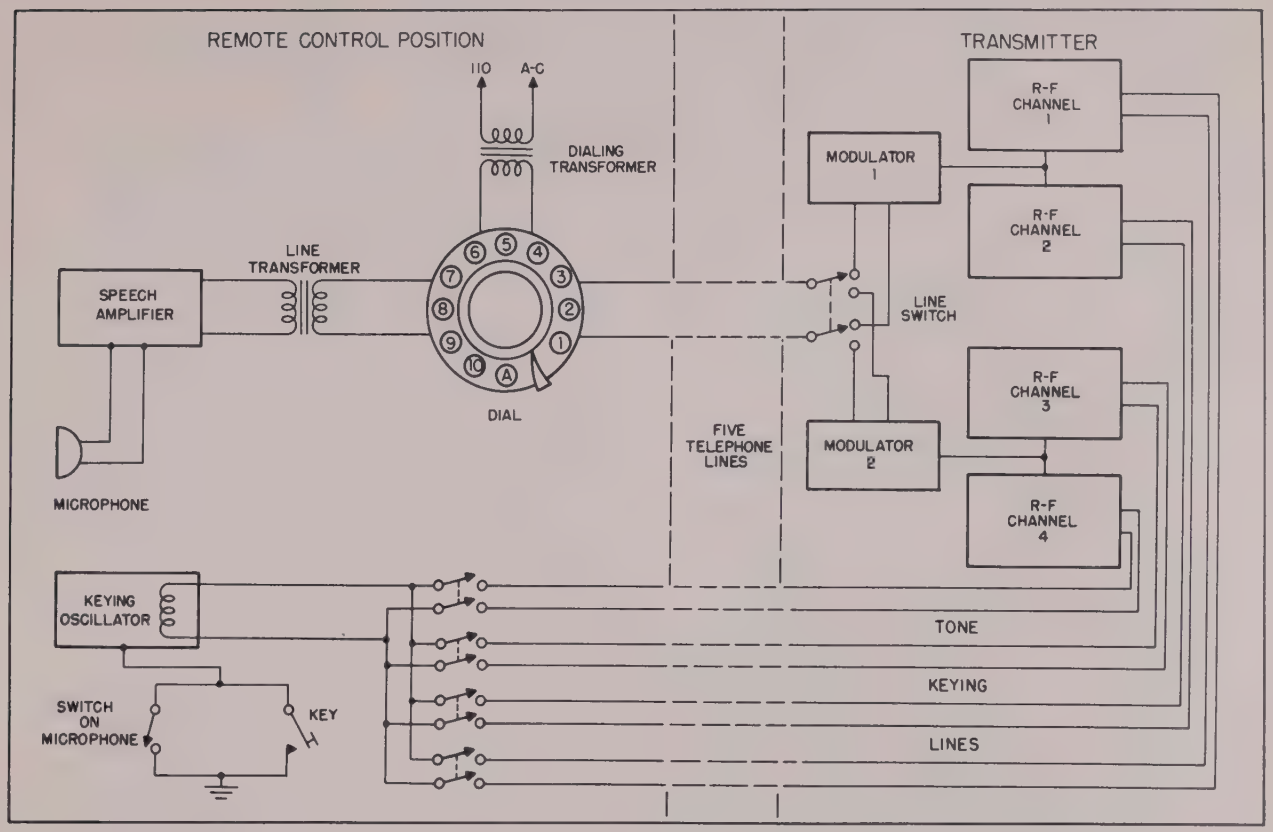

Figure 2-8. Remote Control with Five Telephone Lines, Radio Transmitter Model 99A

g. Dial number 9. Wait 30 seconds for the time delay relay to operate.

h. Dial the number shown in Table V corresponding with the voice channel desired. The white pilot lamp, for the selected channel, lights.

i. Press the switch button on microphone handle. The red pilot lamp, corresponding with the modulator in use, lights. Speak into the microphone in a normal manner and observe the CURRENT meter. Adjust the MICROPHONE INPUT control to the point where normal speech produces current peaks of maximum 300-ma.

j. Release the channel, when transmission is ended, by dialing 10. The red HIGH VOLTAGE pilot lamp will remain lighted.

2-58. LOW POWER VOICE EMISSION. (See figures 2-3, 2-11, and 2-12.)

a. Turn the two position POWER switch to the LO position.

b. Perform operations b through g, paragraph 2-57.

c. Dial the number shown in Table V corresponding with the voice channel desired. The white pilot lamp, for the selected channel, and the red pilot lamp which indicates the modulator in use, now light.

d. Press the switch button on microphone handle and speak into the microphone in a normal manner. While speaking, observe the CURRENT meter. Adjust the MICROPHONE INPUT control to the point where normal speech produces current peaks of maximum 80-ma.

e. Release the channel, when transmission is ended, by dialing 10. The red HIGH VOLTAGE pilot lamp will remain lighted.

2-59. HIGH POWER C-W EMISSION. (See figures 2-11, 2-12, and 2-13.)

a. Refer to figure 2-13 which shows the simplest method of keying the transmitter locally.

b. Insert the plug at the end of the key cable in the jack corresponding with the c-w channel desired.

c. Turn the two position POWER switch to the HI position.

d. Refer to figure 2-11 and place the two position toggle switch, designated LINE 1—LINE 2, in the position shown in Table V corresponding with the c-w channel desired.

e. Refer to figure 2-12 and turn the three position MICROPHONE INPUT switch to the same line position selected in step d above.

f. If the switches used in steps d and e are in the LINE 1 position, refer to figure 2-12 and place the AUDIO INPUT switch for LINE 1 in OFF position. If LINE 2 is used, place the AUDIO INPUT switch for LINE 2 in the OFF position.

g. Dial number 9 and wait 30-seconds for the time delay relay to operate.

h. Dial the number shown in Table V corresponding

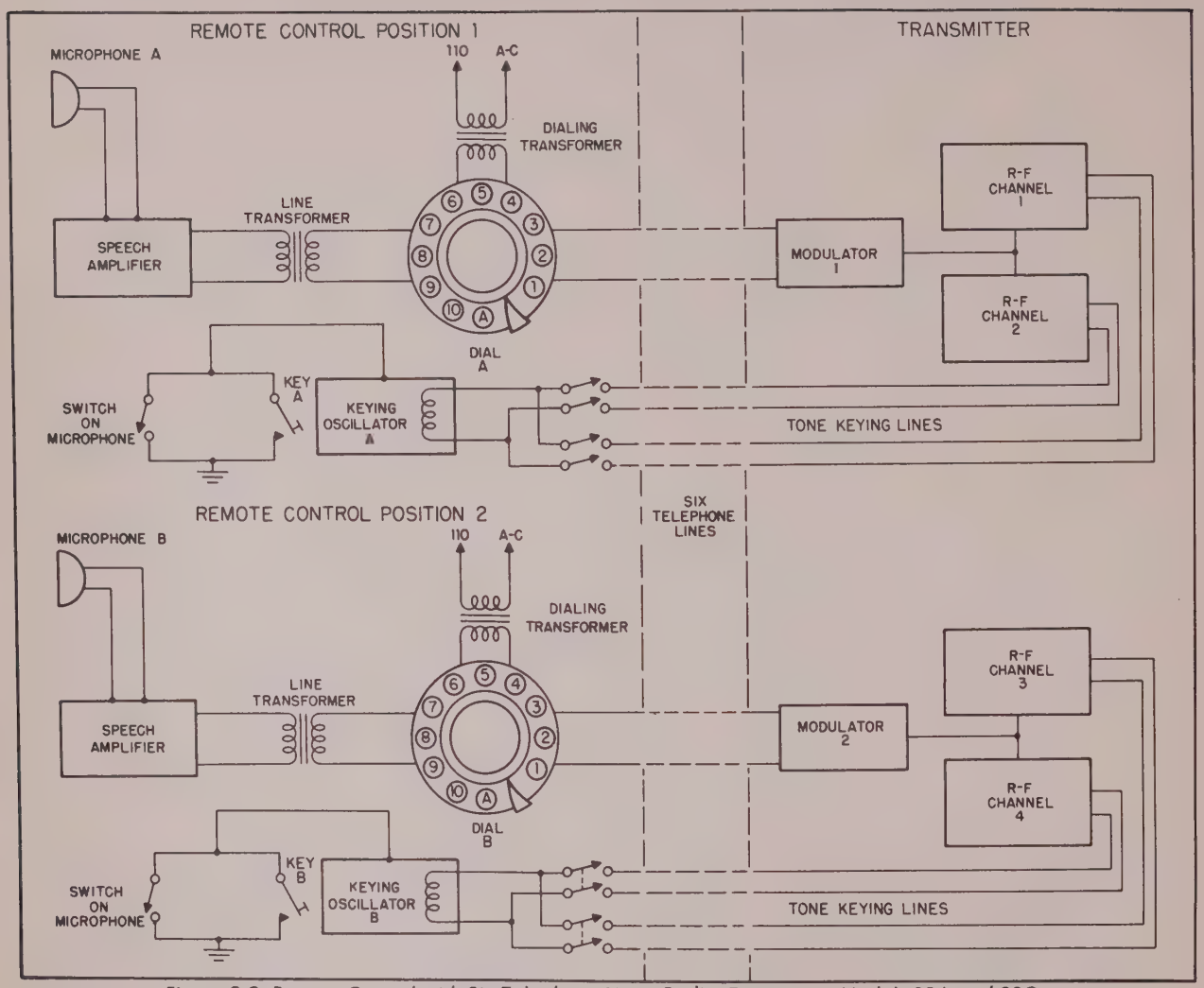

Figure 2-9. Remote Control with Six Telephone Lines, Radio Transmitter Models 99A and 99C

with the c-w channel desired. The white pilot lamp, for the selected channel, now lights.

i. Transmit the telegraph message.

j. Release the channel by dialing number 10.

2-60. LOW POWER C-W EMISSION. (See figures 2-11, 2-12, and 2-13.)

a. Perform operations a and b, paragraph 2-59.

b. Turn the two position POWER switch to the LO position.

c. Perform operations d through j, paragraph 2-59.

2-61. HIGH POWER TELETYPE EMISSION. (See figures 2-11 and 2-12.)

a. Turn the two position POWER switch to the HI position.

b. Refer to figure 2-11 and place the two position toggle switch, designated LINE 1—LINE 2, in the position shown in Table V corresponding with the teletype channel desired.

c. Refer to figure 2-12 and turn the three position MICROPHONE INPUT switch to the same line position selected in step b above.

d. If the switches used in steps b and c are in the LINE 1 position, refer to figure 2-12 and place the AUDIO INPUT switch for LINE 1 in the OFF position. If LINE 2 is used, place the AUDIO INPUT switch for LINE 2 in the OFF position.

e. Lift the FSK INPUT toggle switch, shown in Table V and corresponding with the desired r-f channel, to the ON position.

f. Dial number 9 and wait 30 seconds for the time delay relay to operate.

g. Dial the number shown in Table V corresponding with the teletype channel desired. The white pilot lamp, for the selected channel, now lights.

h. Transmit the teletype message.

i. Release the channel by dialing number 10.

2-62. LOW POWER TELETYPE EMISSION. (See figures 2-11 and 2-12.)

a. Turn the two position POWER switch to the LO position.

b. Perform operations b through i, paragraph 2-61.

2-63. REMOTE CONTROL, C-W AND VOICE.

Note

The remote control arrangement covered in paragraphs 2-65 through 2-72 depends upon the simplex control system in which d-c carrier control voltage is obtained by grounding the simplex circuit of the channel control line(s) at the remote control position. The basic system is shown in figure 2-7.

2-64. PREPARATORY ACTION AT THE TRANSMITTER STATION. (See figures 2-11 and 2-12.)

a. Close the main a-c line switch.

b. Press the HIGH VOLTAGE CONTROL button.

c. Turn the MICROPHONE INPUT switch to the OFF position.

d. Place each of the two AUDIO INPUT switches in the ON position.

2-65. REMOTE CONTROL OVER TWO TELEPHONE LINES. (See figure 2-7.)

2-66. STARTING AND STOPPING THE EQUIPMENT.

2-67. STARTING.

a. Turn on the remote control equipment.

b. Dial 9 on the telephone dial A (See figure 2-7) if operation on transmitter channels 1 or 2 is desired. Dial 9 on telephone dial B if operation on transmitter channels 3 or 4 is desired. After dialing, wait 30 seconds for the transmitter tubes to warm up.

2-68. STOPPING.

a. Use the same dial previously used to start the equipment and dial 10.

b. If operation is to be discontinued for a lengthy period, turn off the remote control equipment.

2-69. HIGH POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-12.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and microphone A shown in figure 2-7. Channels 3 and 4 are controlled with dial B and microphone B.

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table VI.

d. Press the microphone switch and speak into the microphone at normal voice level.

e. Release the channel, when transmission is ended, by dialing 10. (See notes below.)

Note

Two operators are frequently assigned to the remote control station equipped with two telephone control lines. One operator, at Remote Control Position A, can control transmitter channels 1 or 2 with dial A and microphone A or key A. (See figure 2-7.) Simultaneously, the second operator at Remote Control Position B can control transmitter channels 3 or 4 with dial B and microphone B or key B.

Note

When two transmitter channels are used simultaneously, the operator who first completes transmission should release his channel by dialing number 5-6-7 or 8. Number 10 should not be dialed until both operators conclude transmission and desire to stop the transmitter. Premature dialing of number 10, although non-injurious to the equipment, will deprive the second operator of his channel and delay transmission until the transmitter is again started and the channel energized.

2-70. LOW POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the LO position. (See figure 2-12.)

b. Perform operations b through e, paragraph 2-69. Read the three notes in that paragraph.

2-71. HIGH POWER C-W EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-12.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and key A shown in figure 2-7. Channels 3 and 4 are controlled with dial B and key B.

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table VI.

d. Manipulate the telegraph key.

e. Release the channel, when transmission is ended, by dialing 10. (See the two notes immediately preceding paragraph 2-70.)

2-72. LOW POWER C-W EMISSION.

a. Instruct the operator at the transmitter to turn the transmitter POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-71.

2-73. REMOTE CONTROL WITH TONE KEYING, (See figure 2-9.)

Note

The remote control arrangement covered in paragraphs 2-74 through 2-80 depends upon tone keying in which carrier control voltage is obtained from a tone signal, applied at the remote

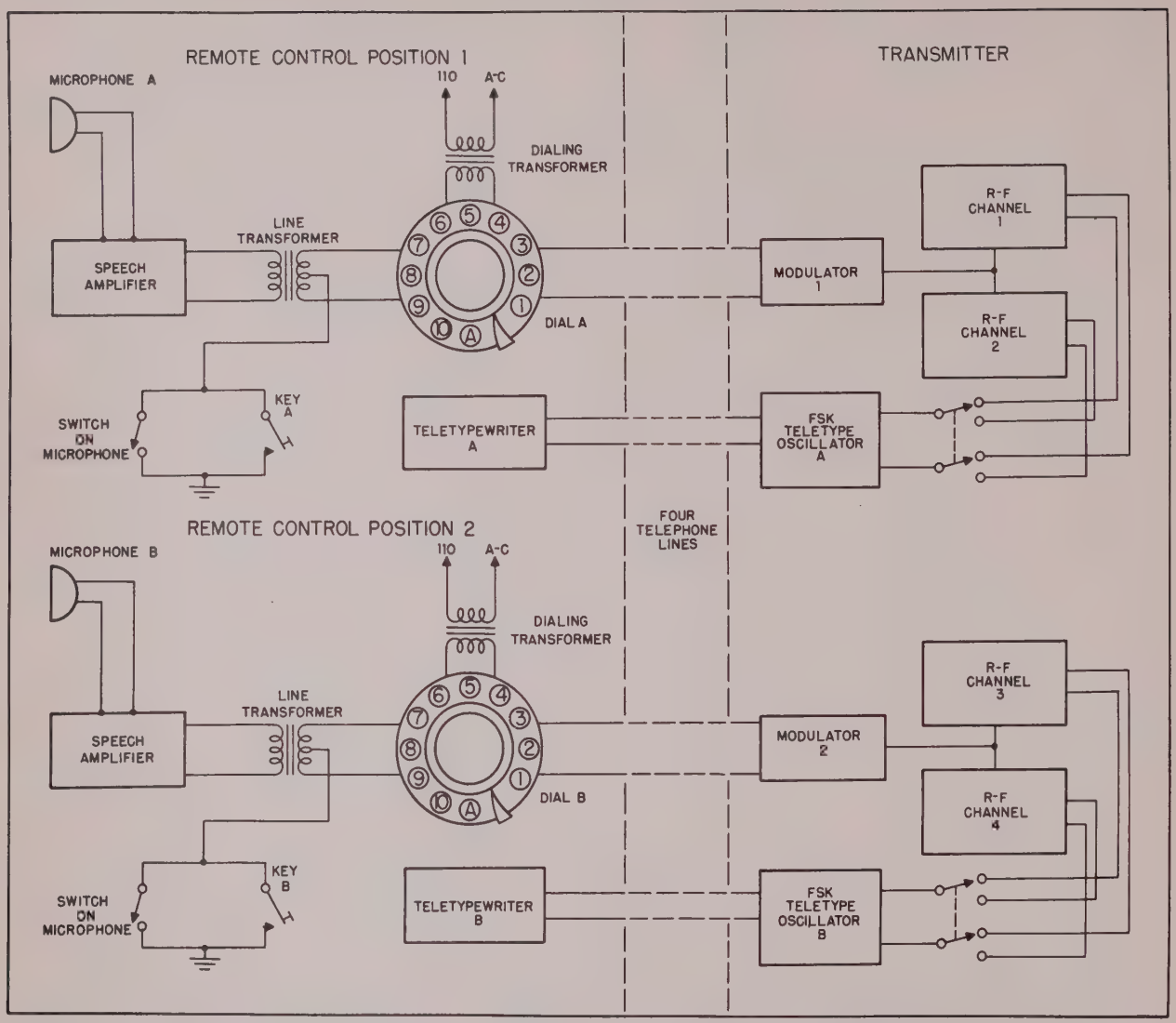

Figure 2-10. Remote Control and Teletype with Four Telephone Lines, Radio Transmitter Models 99A and 99C

control point and conducted over telephone control lines, which actuates the carrier control relay in the desired r-f channel. The basic system is shown in figure 2-9.

2-74. STARTING AND STOPPING THE EQUIPMENT.

2-75. STARTING.

a. Turn on the remote control equipment.

b. Dial 9 on telephone dial A (See figure 2-9) if operation on transmitter channels 1 or 2 is desired. Dial 9 on telephone dial B if operation on transmitter channels 3 or 4 is desired. After dialing, wait 30 seconds for the transmitter tubes to warm up.

2-76. STOPPING.

a. Use the same dial previously used to start the equipment and dial 10.

b. If operation is to be discontinued for a lengthy period, turn off the remote control equipment.

2-77. HIGH POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-12.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and microphone A shown in figure 2-9. Channels 3 and 4 are controlled with dial B and microphone B.

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table VI.

d. Press the microphone switch and speak into the microphone at normal voice level.

e. Release the channel, when transmission is ended, by dialing 10. (See notes below.)

Note

Two operators are frequently assigned to the remote control station equipped with six telephone control lines. One operator, at Remote Control Position A, can control transmitter channels 1 or 2 with dial A and microphone A or key A. (See figure 2-9.) Simultaneously, the second operator at Remote Control Position B can control transmitter channels 3 or 4 with dial B and microphone B or key B.

Note

When two transmitter channels are used simultaneously, the operator who first completes transmission should release his channel by dialing number 5-6-7 or 8. Number 10 should not be dialed until both operators conclude transmission and desire to stop the transmitter. Premature dialing of number 10, although non-injurious to the equipment, will deprive the second operator of his channel and delay transmission until the transmitter is again started and the channel energized.

2-78. LOW POWER VOICE EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the LO position. (See figure 2-12.)

b. Perform operations b through e, paragraph 2-77. Read the three notes in that paragraph.

2-79. HIGH POWER C-W EMISSION.

a. Instruct the operator at the transmitter station to turn the transmitter POWER switch to the HI position. (See figure 2-12.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and key A shown in figure 2-9. Channels 3 and 4 are controlled with dial B and key B.

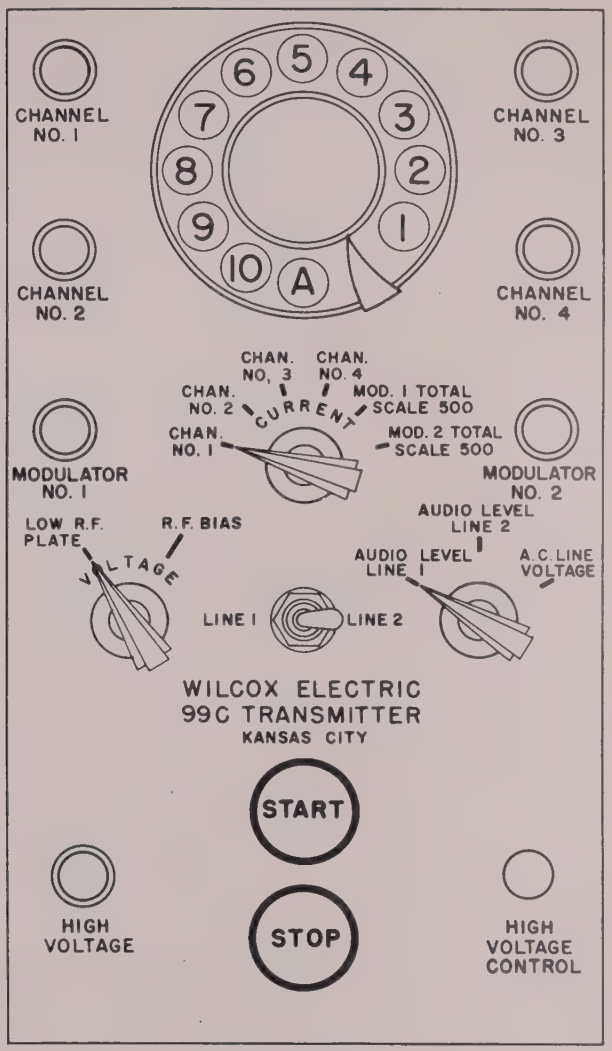

Figure 2-11. Radio Transmitter Model 99C, Main Control Panel

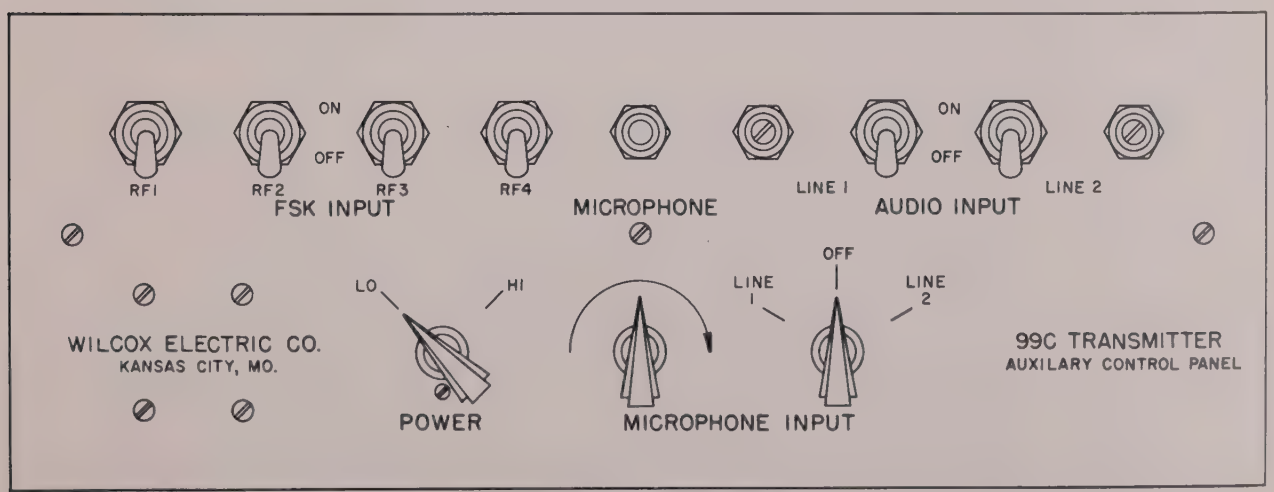

Figure 2-12. Radio Transmitter Model 99C, Auxiliary Control Panel

TABLE V. TRANSMITTER DIAL FUNCTIONS AND CONTROL SETTINGS, LOCAL CONTROL, RADIO TRANSMITTER MODEL 99C

Local Dial No.	Emission	R-f Channel	Line Switch Figure 2-11, thrown to:	MICROPHONE INPUT Switch, Figure 2-12, turned to:	AUDIO INPUT Switch, Figure 2-12, turned OFF:	CURRENT Switch Figure 2-11, turned to:	FSK INPUT Switch, Figure 2-12, thrown to ON:
1	C-W	1	LINE 1	LINE 1	LINE 1	— — —	— —
1	Teletype	1	LINE 1	LINE 1	LINE 1	— — —	RF 1
2	Voice	1	LINE 1	LINE 1	LINE 1	MOD. 1 TOTAL	— —
3	C-W	2	LINE 1	LINE 1	LINE 1	— — —	— —
3	Teletype	2	LINE 1	LINE 1	LINE 1	— — —	RF 2
4	Voice	2	LINE 1	LINE 1	LINE 1	MOD. 1 TOTAL	— —
1	C-W	3	LINE 2	LINE 2	LINE 2	— — —	— —
1	Teletype	3	LINE 2	LINE 2	LINE 2	— — —	RF 3
2	Voice	3	LINE 2	LINE 2	LINE 2	MOD. 2 TOTAL	— —
3	C-W	4	LINE 2	LINE 2	LINE 2	— — —	— —
3	Teletype	4	LINE 2	LINE 2	LINE 2	— — —	RF 4
4	Voice	4	LINE 2	LINE 2	LINE 2	MOD. 2 TOTAL	— —
5 6 7 8	Channel Release. See note preceding paragraph 2-70.						
9	Start						
10	Stop						

TABLE VI. REMOTE DIAL FUNCTIONS AND TRANSMITTER CONTROL SETTINGS, REMOTE CONTROL, RADIO TRANSMITTER MODEL 99C

Remote Dial No.	Emission	R-f Channel		MICROPHONE INPUT Switch, Figure 2-12, turned to:	AUDIO INPUT Switch, Figure 2-12, turned ON:	CURRENT Switch Figure 2-11, turned to:	FSK INPUT Switch, Figure 2-12, thrown to ON:
1	Teletype	1		OFF	LINE 1	— — —	— —
1	C-W	1		OFF	LINE 1	— — —	RF 1
2	Voice	1		OFF	LINE 1	MOD. 1 TOTAL	— —
3	C-W	2		OFF	LINE 1	— — —	— —
3	Teletype	2		OFF	LINE 1	— — —	RF 2
4	Voice	2		OFF	LINE 1	MOD. 1 TOTAL	— —
1	C-W	3		OFF	LINE 2	— — —	— —
1	Teletype	3		OFF	LINE 2	— — —	RF 3
2	Voice	3		OFF	LINE 2	MOD. 2 TOTAL	— —
3	C-W	4		OFF	LINE 2	— — —	— —
3	Teletype	4		OFF	LINE 2	— — —	RF 4
4	Voice	4		OFF	LINE 2	MOD. 2 TOTAL	— —
5 6 7 8	Channel Release. See note preceding paragraph 2-70.						
9 10	Start Stop						

b. Select the transmitter channel desired and dial 9, using the proper dial. (See preceding note.) Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired transmitter channel as shown in Table VI.

d. Manipulate the telegraph key.

e. Release the channel, when transmission is ended, by dialing 10. (See the notes immediately preceding paragraph 2-78.)

2-80. LOW POWER C-W EMISSION.

a. Instruct the operator at the transmitter to turn the transmitter POWER switch to the LO position.

b. Perform operations b through e, paragraph 2-79.

2-81. REMOTE CONTROL, TELETYPE. (See figure 2-10.)

Note

Figure 2-10 shows a typical remote teletype installation in which two teletypewriters are used at the remote control point to actuate related FSK oscillators at the transmitter. As indicated, a separate telephone line is required for each teletype circuit. Transmitter control circuits, shown in figure 2-10, are otherwise identical to the two line system described in paragraph 2-65 through 2-72.

2-82. PREPARATORY ACTION AT THE TRANSMITTER STATION. (See figures 2-10, 2-11, and 2-12.)

a. Connect the FSK oscillators to the desired r-f channels.

b. Close the main a-c line switch.

c. Press the HIGH VOLTAGE CONTROL button.

2-83. HIGH POWER TELETYPE EMISSION.

a. Instruct the operator at the transmitter to turn the POWER switch to the HI position, and to lift the FSK INPUT toggle switch, corresponding to the desired r-f channel, to the ON position. (See Table VI.)

Note

Transmitter channels 1 and 2 are controlled with telephone dial A and teletypewriter A shown in figure 2-10. Channels 3 and 4 are controlled with dial B and teletypewriter B.

b. Use the proper telephone dial and dial 9. Wait 30 seconds for the transmitter tubes to warm up.

c. Dial the number of the desired teletype channel shown in Table VI.

d. Transmit the teletype message.

e. Release the channel, when transmission is ended, by dialing 10.

2-84. LOW POWER TELETYPE EMISSION.

a. Instruct the operator at the transmitter to turn the POWER switch to the LO position, and to lift the FSK INPUT toggle switch, corresponding to the desired r-f channel, to the ON position.

b. Perform operations b through e, paragraph 2-83.

Note

Read the notes immediately preceding paragraph 2-70. Two teletype operators can be similarly assigned to the remote control station if the station is arranged as shown in figure 2-10.

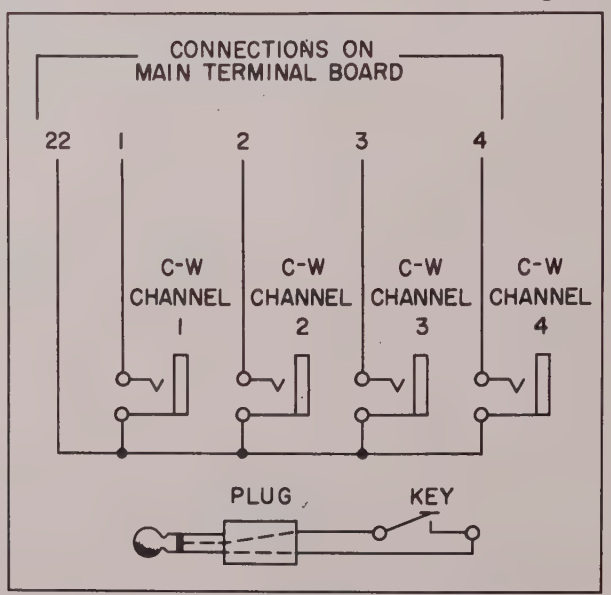

Figure 2-13. Keying Cable Assembly, Radio Transmitter Model 99C

SECTION III
OPERATING CHECKS AND ADJUSTMENTS

3-1. GENERAL. In the checks and adjustments contained in this section, Radio Transmitter Model 99A or Radio Transmitter Model 99C is assumed to be:

a. Installed.

b. Connected to the source of a-c power.

c. Connected to the antenna system.

d. Connected to the remote control telephone line(s), if applicable.

e. Pre-tuned to each of its four operating frequencies.

3-2. TEST EQUIPMENT REQUIRED. No test equipment, beyond the four meters incorporated in the transmitter, is required for the operating checks and adjustments covered in subsequent paragraphs. If the transmitter is remotely controlled, a telephone circuit must be provided between the remote control operator and the transmitter operator to facilitate the issuance and acknowledgement of instructions pertaining to operating checks and adjustments.

3-3. CONTROLS. In addition to the controls shown in figures 2-1, 2-2, 2-3, 2-11, and 2-12, the following controls, illustrated in figures 3-1 and 3-2, are used when making operating checks and adjustments:

a. The TEST KEY is a non-locking switch, actuated by push-button, and is used to temporarily energize the r-f unit on which it is mounted.

b. The AUDIO GAIN control is used to adjust the modulator for proper output level. This control is located on the back of each of the two modulators and is accessible through a hole in the back cover of the transmitter.

c. The OVERLOAD control determines the operating point of the modulator overload relay. This control is located on the back of each of the two modulators and is accessible through a hole in the back cover of the transmitter.

Note

Operating checks and adjustments are given in sequence for each of the two models of transmitting equipment. Paragraphs 3-4 through 3-33 are applicable only to Radio Transmitter Model 99A. Operating checks and adjustments pertinent to Radio Transmitter Model 99C are described in paragraphs 3-34 through 3-62. Typical current and voltage readings for both models are given in Table VII and Table VIII.

3-4. ADJUSTMENTS, RADIO TRANSMITTER MODEL 99A.

3-5. PRIOR TO ACTUAL OPERATION.

Note

The operations described in paragraphs 3-7 through 3-11 are performed when the transmitter and remote control equipment are installed and ready for use. A re-check should be made at 30-day intervals there-after.

3-6. TRANSMITTER ADJUSTMENTS FOR REMOTE CONTROL.

3-7. SPEECH AMPLIFIER. Adjustment of the speech amplifier at the remote control position is necessarily dependent on factors such as the length and the type of telephone line into which the speech amplifier is coupled. In general, the speech amplifier should be adjusted to an output level not exceeding O-db (0.006 watt.)

3-8. MODULATORS. (See figures 2-1, 2-2, 2-3, and 3-2.) The two modulators incorporated in Radio Transmitter Model 99A are adjusted by the transmitter operator in the following manner:

a. Close the main a-c line switch and press the HIGH VOLTAGE CONTROL button.

b. Turn the selector switch to LINE 1 and the CURRENT switch to MOD. 1 TOTAL.

c. Set the AUDIO INPUT control at mid-position.

d. Remove the plugs from the four holes in the back cover of the cabinet.

e. Instruct the remote control operator to dial number 9. Wait 30-seconds for the time delay relay to operate.

f. Instruct the remote control operator to dial number 2, press the microphone switch, and transmit a test message at normal voice level.

g. Observe the CURRENT meter while the remote control operator is speaking. On voice peaks, the CURRENT meter should read a maximum of 300-ma.

h. If current peaks greater than 300-ma are obtained, insert a screwdriver in the hole labeled Modulator No. 1, Audio Gain (figure 3-2), and turn the control shaft in a counter-clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

Note

The assistance of a second operator at the transmitter, to observe CURRENT meter readings while the audio gain control at the rear of the transmitter is adjusted by the first operator, is recommended.

i. If current peaks do not reach a maximum of 300-ma, turn the control shaft in a clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

j. Instruct the remote control operator to release the microphone switch and dial number 5.

k. Turn the switch designated LINE 1 — LINE 2 to

the LINE 2 position and turn the CURRENT switch to the MOD. 2 TOTAL position.

l. Perform operations f through i, paragraph 3-8, adjusting the control labeled Modulator No. 2, Audio Gain, shown in figure 3-2.

m. Instruct the remote control operator to terminate the test transmission and to dial number 10.

3-9. TRANSMITTER ADJUSTMENTS FOR MODULATOR OVERLOAD PROTECTION.

3-10. MODULATOR NO. 1 OVERLOAD. (See figures 2-1, 2-2, 2-3, and 3-2.)

a. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack.

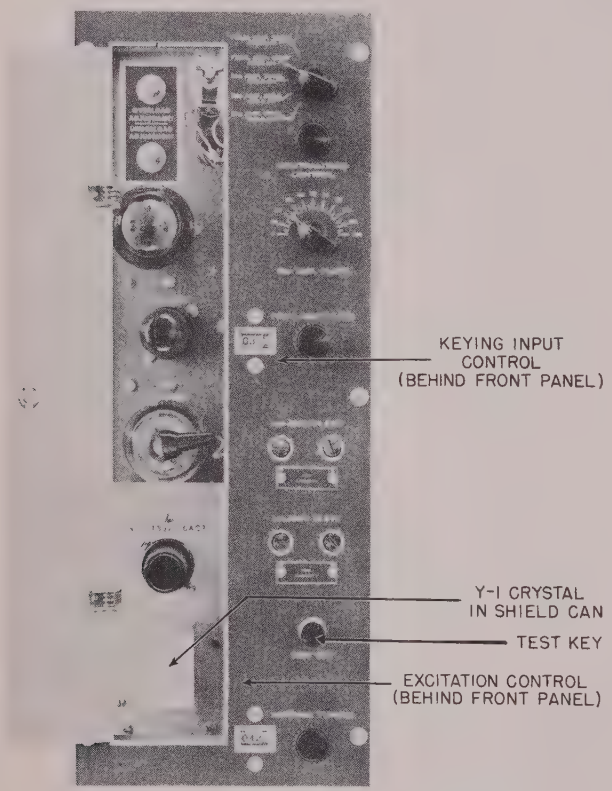

Figure 3-1. R-F Unit Type 95415B and Type 95415C, Front Panel

b. Turn the LINE 1 — LINE 2 switch to the LINE 1 position and turn the CURRENT switch to the MOD. 1 TOTAL position.

c. Dial number 9 and wait 30-seconds for the time delay relay to operate.

d. Dial number 2, press the microphone switch, and transmit a test message at normal voice level.

e. While speaking, observe the CURRENT meter and adjust the MIC. INPUT control to the point where normal speech produces current peaks of 350-ma.

f. Instruct an assistant operator to insert a screwdriver in the hole labeled Modulator No. 1, overload (figure 3-2), and adjust the control shaft to the point where current peaks of 350-ma cause the overload relay to operate. This will be evidenced by the clap of the high voltage relay as it is released and by the momentary loss of high plate voltage.

g. Retard the setting of the MIC. INPUT control, stopping at the point where normal speech produces current peaks of maximum 300-ma.

h. Release the microphone switch and dial number 5.

3-11. MODULATOR NO. 2 OVERLOAD. (See figures 2-1, 2-2, 2-3, and 3-2.)

a. Turn the switch designated LINE 1 — LINE 2 to the LINE 2 position and turn the CURRENT switch to the MOD. 2 TOTAL position.

b. Perform operations d through f, paragraph 3-10, adjusting the control designated in figure 3-2 as Modulator No. 2 overload.

c. Retard the setting of the MIC. INPUT control, stopping at the point where normal speech produces current peaks of maximum 300-ma.

d. Release the microphone switch and dial number 10.

e. Replace the four plugs in the holes in the back cover of the transmitter.

3-12 DURING ACTUAL OPERATION.

3-13. REMOTE CONTROL.

a. Turn the CURRENT switch to the position corresponding with the modulator selected and being used by the remote control operator.

b. Observe the CURRENT meter while the remote control operator is speaking and, if necessary, adjust the AUDIO INPUT control to the point where current peaks of maximum 300-ma are obtained.

3-14. LOCAL CONTROL.

a. Turn the CURRENT switch to the position corresponding with the modulator in use.

b. Observe the CURRENT meter while transmitting the voice message and, if necessary, adjust the MIC. INPUT control for current peaks of maximum 300-ma.

3-15. OPERATING CHECKS, RADIO TRANSMITTER MODEL 99A.

3-16. LOCAL CONTROL.

3-17. PRIOR TO ACTUAL OPERATION.

Note

The operating checks described in paragraphs 3-17 through 3-33 should be made once each day by the transmitter operator prior to opening the station for communications service.

3-18. STARTING. (See figures 2-1 and 2-3.)

a. Close the main a-c line switch and turn the three position line switch to the A. C. LINE VOLTAGE position. The AUDIO LEVEL — LINE VOLTAGE meter should read 220-volts within ±3%.

b. Turn the two position VOLTAGE switch to the LOW R. F. PLATE position, and dial number 9. The blowers should start. Observe the LOW VOLTAGE meter. Fol-

lowing a 30-second delay interval, a meter reading of 650-volts, within ±15%, should be obtained.

c. Press the HIGH VOLTAGE CONTROL button. The red pilot light designated HIGH VOLTAGE should light. (See figure 2-1.) Subsequent checks are made with the HIGH VOLTAGE CONTROL button pushed in.

3-19. R-F UNIT NO 1.

a. Turn the two position switch designated LINE 1 — LINE 2 to position LINE 1 and turn the POWER switch to position HI. (See figures 2-1 and 2-2.)

b. Turn the six position CURRENT switch to position designated CHAN. NO. 1 and the circuit selector switch at the top of R-f Unit No. 1 to position FINAL AMP. TOTAL. (See figures 2-1 and 2-4.)

c. Dial number 1. The white pilot lamp designated CHANNEL NO. 1 should light. (See figure 2-1.)

d. Press the TEST KEY and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 380-ma, within —5%, should be obtained. Release the TEST KEY.

e. Turn the circuit selector switch to the position designated FINAL AMP. GRID, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 50-ma, within —20%, should be obtained. Release the TEST KEY.

f. Turn the circuit selector switch to the position designated 3RD AMP. TOTAL, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 100-ma, within +50-20% should be obtained. Release the TEST KEY.

g. Turn the circuit selector switch to 3RD AMP. GRID, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 3-ma, within ±65%, should be obtained. Release the TEST KEY.

h. Turn the circuit selector switch to 2ND AMP. TOTAL, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 20-ma, within +100-50%, should be obtained. Release the TEST KEY.

i. Turn the two position VOLTAGE switch to the position designated R.F. BIAS and observe the LOW VOLTAGE meter. (See figures 2-1 and 2-3.) A meter reading of 340-volts, within ±15%, should be obtained. Release the TEST KEY.

j. Observe the HIGH VOLTAGE meter. It should read 2500-volts within ±10%.

k. Dial number 5. The white pilot lamp designated CHANNEL NO. 1 should go out.

3-20. R-F UNIT NO. 2.

a. Turn the six position CURRENT switch to position designated CHAN. NO. 2 and the circuit selector switch at the top of R-f Unit No. 2 to FINAL AMP. TOTAL.

b. Dial number 3. The white pilot lamp designated CHANNEL NO. 2 should light.

c. Perform operations d through i, paragraph 3-19.

d. Dial number 5. The white pilot lamp designated CHANNEL NO. 2 should go out.

3-21. R-F UNIT NO. 3.

a. Turn the two position switch designated LINE 1 — LINE 2 to position LINE 2.

b. Turn the six position CURRENT switch to CHAN. NO. 3 and the circuit selector switch at the top of R-f Unit No. 3 to FINAL AMP. TOTAL.

c. Dial number 1. The white pilot lamp designated CHANNEL NO. 3 should light.

d. Perform operations d through i, paragraph 3-19.

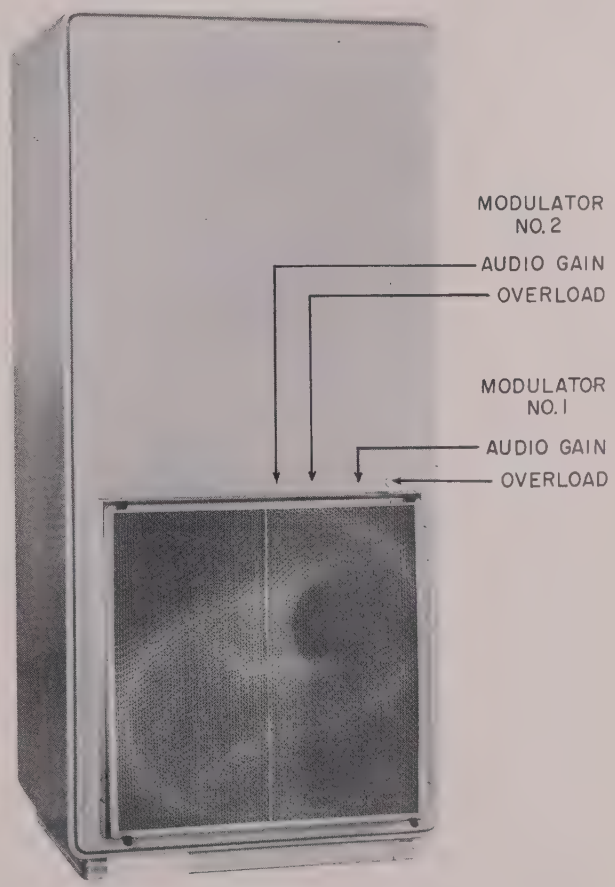

Figure 3-2. Radio Transmitter Models 99A and 99C, Rear View

e. Dial number 5. The white pilot lamp designated CHANNEL NO. 3 should go out.

3-22. R-F UNIT NO. 4.

a. Turn the six position CURRENT switch to CHAN. NO. 4 and the circuit selector switch at the top of R-f Unit No. 4 to FINAL AMP. TOTAL.

b. Dial number 3. The white pilot lamp designated CHANNEL NO. 4 should light.

c. Perform operations d through i, paragraph 3-19.

d. Dial number 5. The white pilot lamp designated CHANNEL NO. 4 should go out.

3-23. MODULATOR NO. 1.

a. Turn the two position line selector switch designated LINE 1 — LINE 2 to LINE 1 position.

b. Turn the six position CURRENT switch to the MOD. 1 TOTAL position.

c. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack.

d. Dial number 2. The white pilot lamp designated CHANNEL NO. 1 should light.

e. Press the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 1 should light.

f. Speak into the microphone at normal voice level and observe the CURRENT meter. Current peaks of maximum 300-ma should be obtained.

g. Release the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 1 should go out.

h. Dial number 5. The white pilot lamp designated CHANNEL NO. 1 should go out.

3-24. MODULATOR NO. 2.

a. Turn the two position line selector switch designated LINE 1 — LINE 2 to LINE 2 position.

b. Turn the six position CURRENT switch to the MOD. 2 TOTAL position.

c. Dial number 2. The white pilot lamp designated CHANNEL NO. 3 should light.

d. Press the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 2 should light.

e. Speak into the microphone at normal voice level and observe the CURRENT meter. Current peaks of maximum 300-ma should be obtained.

f. Release the switch on microphone handle. The red MODULATOR NO. 2 pilot lamp should go out.

g. Dial number 10. The blowers should stop and the white CHANNEL NO. 3 pilot lamp should go out.

3-25. REMOTE CONTROL.

3-26. GENERAL. Operating checks pertinent to remote control equipment must necessarily depend upon the control system employed. The following instructions are applicable to the system described in paragraphs 2-15 through 2-22, and illustrated in figure 2-6, in which remote control is accomplished over one telephone line.

3-27. PREPARATORY ACTION BY THE TRANSMITTER OPERATOR. (See figures 2-1, 2-3, and 2-4.)

a. Turn the two position switch, designated LINE 1 — LINE 2 to the LINE 1 position.

b. Turn the six position CURRENT switch to CHAN. NO. 1.

c. Turn each circuit selector switch at the top of the four R-f Units to FINAL AMP. TOTAL.

d. Inform the remote control operator, by telephone, that the transmitter is in readiness for operating checks.

3-28. R-F UNIT NO. 1.

a. Instruct the remote control operator to dial number 9. The blowers should start. Wait 30-seconds for the time delay relay to operate.

b. Instruct the remote control operator to dial number 1. The white pilot lamp designated CHANNEL NO. 1 should light.

c. Instruct the remote control operator to hold the telegraph key closed. The CURRENT meter should register 380-ma within —5%.

d. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should follow the keying impulses.

e. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 1 pilot lamp should go out.

3-29. R-F UNIT NO. 2.

a. Turn the CURRENT switch to CHAN. NO. 2.

b. Instruct the remote control operator to dial number 3. The white pilot lamp designated CHANNEL NO. 2 should light.

c. Instruct the remote control operator to hold the telegraph key closed. The CURRENT meter should read 380-ma within —5%.

d. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should follow the keying impulses.

e. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 2 pilot lamp should go out.

3-30. R-F UNIT NO. 3.

a. Turn the switch designated LINE 1 — LINE 2 to the LINE 2 position and the CURRENT switch to CHAN. NO. 3.

b. Instruct the remote control operator to dial number 1 and hold the telegraph key closed. The white CHANNEL NO. 3 pilot lamp should light and the CURRENT meter should read 380-ma within —5%.

c. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should follow the keying impulses.

d. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 3 pilot lamp should go out.

3-31. R-F UNIT NO. 4.

a. Turn the CURRENT switch to CHAN. NO. 4 and instruct the remote control operator to dial number 3. The white CHANNEL NO. 4 pilot lamp should light.

b. Instruct the remote control operator to hold the telegraph key closed. The CURRENT meter should read 380-ma within —5%.

c. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should follow the keying impulses.

d. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 4 pilot lamp should go out.

3-32. MODULATOR UNIT NO. 1.

a. Turn the switch designated LINE 1 — LINE 2 to the LINE 1 position and the CURRENT switch to MOD. 1 TOTAL.

TABLE VII. TYPICAL CURRENT READINGS, RADIO TRANSMITTER MODELS 99A AND 99C

CURRENT METER. (See figure 2-3.) The CURRENT meter indicates total current flow in either of the two modulators and various currents in any of the four r-f units.

CURRENT SWITCH. (See figures 2-1 and 2-11.) Turn CURRENT switch to the position corresponding with the modulator or r-f channel in use.

CIRCUIT SELECTOR SWITCH. (See figure 2-4.) Turn circuit selector switch of the r-f channel in use to the metering position desired.

POWER SWITCH. (See figures 2-2 and 2-12.) Turn POWER switch to HI or LO depending on power output desired.

CURRENT Switch Position	Circuit Selector Switch Position	TYPICAL READINGS		
		POWER Switch HI	POWER Switch LO	% Tolerance
MOD. 1 TOTAL	Not used	*300-ma	*80-ma	+0-0
MOD. 2 TOTAL	Not used	*300-ma	*80-ma	+0-0
CHAN. NO. 1	FINAL AMP. TOTAL	380-ma	125-ma	+0-5
	FINAL AMP. GRID	50-ma	50-ma	+0-20
	3RD AMP. TOTAL	100-ma	100-ma	+50-20
	3RD AMP. GRID	3-ma	3-ma	+65-65
	2ND AMP. TOTAL	20-ma	20-ma	+100-50
CHAN. NO. 2	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1
CHAN. NO. 3	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1
CHAN. NO. 4	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1	Same as Chan. 1

*Maximum current peak occurring at 100% modulation level.

b. Instruct the remote control operator to dial number 2. The white CHANNEL NO. 1 pilot lamp should light.

c. Instruct the remote control operator to press the microphone switch. The red MODULATOR NO. 1 pilot lamp should light.

d. Instruct the remote control operator to speak into the microphone and make a short test transmission. The CURRENT meter should read maximum 300-ma on voice peaks.

e. Instruct the remote control operator to release the microphone switch and dial number 5. The pilot lamps designated CHANNEL NO. 1 and MODULATOR NO. 1 should go out.

3-33. MODULATOR UNIT NO. 2.

a. Turn the switch designated LINE 1 — LINE 2 to the LINE 2 position and the CURRENT switch to MOD. 2 TOTAL.

b. Instruct the remote control operator to dial number 2. The white CHANNEL NO. 3 pilot lamp should light.

c. Instruct the remote control operator to press the microphone switch. The red MODULATOR NO. 2 pilot lamp should light.

d. Instruct the remote control operator to speak into the microphone and make a short test transmission. The CURRENT meter should read maximum 300-ma on voice peaks.

e. Instruct the remote control operator to release the microphone switch and dial number 10. The pilot lamps designated CHANNEL NO. 3 and MODULATOR NO. 2 should go out and the blowers should stop.

3-34. ADJUSTMENTS, RADIO TRANSMITTER MODEL 99C.

3-35. PRIOR TO ACTUAL OPERATION.

Note

The operations described in paragraph 3-37 through 3-41 are performed when the transmitter and remote control equipment are installed and ready for use. A re-check should be made at 30-day intervals there-after.

3-36. TRANSMITTER ADJUSTMENTS FOR REMOTE CONTROL.

3-37. SPEECH AMPLIFIER. Adjustment of the speech amplifier at the remote control position is necessarily dependent on factors such as the length and the type of telephone line into which the speech amplifier is coupled. In general, the speech amplifier should be adjusted to provide a signal level of —10 db at the audio input terminals of the transmitter. (O-db = 0.006 watt.)

3-38. MODULATORS. (See figures 2-3, 2-11, 2-12, and 3-2.) The two modulators incorporated in Radio Transmitter Model 99C are adjusted by the transmitter operator in the following manner:

a. Close the main a-c line switch and press the HIGH VOLTAGE CONTROL button shown in figure 2-11.

b. Refer to figure 2-11 and turn the six position CURRENT switch to MOD. 1 TOTAL.

c. Turn the MICROPHONE INPUT switch, shown in figure 2-12, to the OFF position.

d. Place each of the two AUDIO INPUT switches,

designated LINE 1 and LINE 2 in figure 2-12, in the ON position.

e. Refer to figure 2-12 and note the location of the two audio imput controls located to the left and to the right of the two AUDIO INPUT switches. Use a screwdriver and turn each control to approximately mid-position.

f. Refer to figure 3-2 and remove the plugs from the four holes in the back cover of the cabinet.

g. Instruct the remote control operator to turn on the remote control equipment and dial number 9, using Dial A in figure 2-7. Wait 30-seconds for the time delay relay to operate.

h. Instruct the remote control operator to dial number 2, press the microphone switch, and transmit a test message at normal voice level.

i. Observe the CURRENT meter while the remote control operator is speaking. On voice peaks, the CURRENT meter should read a maximum of 300-ma.

j. If current peaks greater than 300-ma are obtained, insert a screwdriver in the hole labeled Modulator No. 1, Audio Gain (figure 3-2), and turn the control shaft in a counter-clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

Note

It is recommended that a second operator at the transmitter observe current meter readings while the audio gain control at the rear of the transmitter is being adjusted by the first operator.

k. If current peaks do not reach a maximum of 300-ma, turn the control shaft in a clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

l. Instruct the remote control operator to release the microphone switch and dial number 5.

m. Refer to figure 2-11 and turn the six position CURRENT switch to MOD. 2 TOTAL.

n. Instruct the remote control operator to dial number 2, using Dial B in figure 2-7, and transmit a test message at normal voice level while holding the switch of Microphone B closed.

o. Observe the CURRENT meter while the remote control operator is speaking. On voice peaks, the CURRENT meter should read a maximum of 300-ma.

p. If current peaks greater than 300-ma are obtained, insert a screwdriver in the hole labeled Modulator No. 2, Audio Gain (figure 3-2), and turn the control shaft in a counter-clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

q. If current peaks do not reach a maximum of 300-ma, turn the control shaft in a clockwise direction. Stop at the point where current peaks of maximum 300-ma are obtained.

r. Instruct the remote control operator to terminate the test transmission and to dial number 10.

Note

Preceding step r completes the audio input adjustment of the two modulators incorporated in Transmitter Model 99C. In the event that future re-adjustment becomes necessary, use a screw driver and adjust the AUDIO INPUT control for LINE 1 or LINE 2 (figure 2-12) until the desired CURRENT meter reading of 300-ma on voice peaks is obtained. No adjustment at the rear of the cabinet should be necessary.

3-39. TRANSMITTER ADJUSTMENTS FOR MODULATOR OVERLOAD PROTECTION.

3-40. MODULATOR NO. 1 OVERLOAD. (See figures 2-3, 2-11, 2-12, and 3-2.)

a. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack.

b. Refer to figure 2-12 and place each of the two AUDIO INPUT switches in the OFF position.

c. Turn the MICROPHONE INPUT switch, shown in figure 2-12, to LINE 1.

d. Refer to figure 2-11. Place the two position toggle switch in the LINE 1 position and the six position CURRENT switch in the MOD. 1 TOTAL position.

e. Dial number 9 and wait 30-seconds for the time delay relay to operate.

f. Dial number 2, press the microphone switch, and transmit a test message at normal voice level.

g. While speaking, observe the CURRENT meter and adjust MICROPHONE INPUT control (figure 2-12) to the point at which normal speech produces current peaks of 350-ma.

h. Instruct an assistant operator to insert a screwdriver into the hole labeled MODULATOR NO. 1 OVERLOAD (figure 3-2) and adjust the control shaft to the point at which voice current peaks of 350-ma cause the overload relay to operate. Operation of the overload relay will be evidenced by the clap of the high voltage relay as it is released and the momentary loss of high plate voltage.

i. Retard the setting of the MICROPHONE INPUT control, stopping at the point where normal speech produces current peaks of maximum 300-ma.

j. Release the microphone switch and dial number 5.

3-41. MODULATOR NO. 2 OVERLOAD. (See figures 2-3, 2-11, 2-12, and 3-2.)

a. Refer to figure 2-11. Place the two position toggle switch in the LINE 2 position and the six position CURRENT switch in the MOD. 2 TOTAL position.

b. Turn the MICROPHONE INPUT switch, shown in figure 2-12, to LINE 2.

c. Dial number 2, press the microphone switch, and transmit a test message at normal voice level.

d. While speaking, observe the CURRENT meter and adjust MICROPHONE INPUT control (figure 2-12) to the point at which normal speech produces current peaks of 350-ma.

e. Instruct an assistant operator to insert a screwdriver into the hole labeled MODULATOR NO. 2 OVERLOAD (figure 3-2) and adjust the control shaft to the point where voice current peaks of 350-ma cause the overload

TABLE VIII. TYPICAL VOLTAGE READINGS, RADIO TRANSMITTER MODELS 99A AND 99C

LOW VOLTAGE METER. (See figure 2-3.) The LOW VOLTAGE meter indicates the output voltage of either the low voltage plate supply or the r-f bias supply.

VOLTAGE SELECTOR SWITCH. (See figures 2-1 and 2-11.) The two position VOLTAGE switch selects the voltage supply circuit to be measured with the LOW VOLTAGE meter.

AUDIO LEVEL - LINE VOLTAGE METER. (See figure 2-3.) The AUDIO LEVEL - LINE VOLTAGE meter indicates the audio input level to either modulator or the a-c line voltage.

LINE SELECTOR SWITCH. (See figures 2-1 and 2-11.) The three position line selector switch selects the desired circuit to be measured with the AUDIO LEVEL - LINE VOLTAGE meter.

HIGH VOLTAGE METER. (See figure 2-3.) The HIGH VOLTAGE meter is permanently connected across the output of the high voltage power supply.

LOW VOLTAGE Meter		AUDIO LEVEL — LINE VOLTAGE Meter			
LOW R-F PLATE	R-F BIAS	AUDIO LEVEL LINE 1	AUDIO LEVEL LINE 2	A.C. LINE VOLTAGE	HIGH VOLTAGE Meter
650-volts +15-15%	340-volts +15-15%	10-db +50-50%	10-db +50-50%	220-volts +3-3%	2500-volts +10-10%

relay to operate. This will be evidenced by the clap of the high voltage relay as it is released and the momentary loss of high plate voltage.

f. Retard the setting of the MICROPHONE INPUT control, stopping at the point at which normal speech produces current peaks of maximum 300-ma.

g. Release the microphone switch and dial number 10.

h. Replace the four plugs in the holes in the back cover of the transmitter.

3-42. DURING ACTUAL OPERATION.

3-43. REMOTE CONTROL.

a. Turn the CURRENT switch to the position corresponding with the modulator selected and being used by the remote control operator.

b. Observe the CURRENT meter while the remote control operator is speaking and, if necessary, use a screwdriver and adjust the AUDIO INPUT control (figure 2-12) corresponding with the audio line in use. Adjust to the point where current peaks of 300-ma are obtained.

3-44. LOCAL CONTROL.

a. Turn the CURRENT switch to the position corresponding with the modulator in use.

b. Observe the CURRENT meter while transmitting the voice message, and if necessary, adjust the MICROPHONE INPUT control to the point where current peaks of maximum 300-ma are obtained.

3-45. OPERATING CHECKS, RADIO TRANSMITTER MODEL 99C.

Note

The operating checks described in paragraphs 3-46 through 3-62 should be made once each day by the transmitter operator prior to opening the station for communications service.

3-46. LOCAL CONTROL.

3-47. STARTING. (See figures 2-3, 2-11, and 2-12.)

a. Close the main a-c line switch.

b. Refer to figure 2-11 and turn the three position switch to the position designated A.C. LINE VOLTAGE. The AUDIO LEVEL — LINE VOLTAGE meter should read 220-volts within ±3%.

c. Place the two position toggle switch, shown in figure 2-11, in the LINE 1 position.

d. Refer to figure 2-12 and place each of the two AUDIO INPUT switches in the OFF position. Turn the MICROPHONE INPUT switch to LINE 1.

e. Turn the two position VOLTAGE switch, shown in figure 2-11, to the LOW R.F. PLATE position and dial number 9. Observe the LOW VOLTAGE meter. Following a 30-second delay interval, a meter reading of 650-volts, within ±15%, should be obtained.

f. Press the HIGH VOLTAGE CONTROL button. The red pilot lamp designated HIGH VOLTAGE should light. (See figure 2-11.) Subsequent checks are made with the HIGH VOLTAGE CONTROL button pushed in.

3-48. R-F UNIT NO. 1.

a. Refer to figure 2-12 and turn the POWER switch to HI.

b. Turn the six position CURRENT switch, shown in figure 2-11, to the CHAN. NO. 1 position.

c. Refer to figure 2-4 and turn the circuit selector switch at the top of R-F Unit No. 1 to FINAL AMP. TOTAL.

d. Dial number 1. The white pilot lamp designated CHANNEL NO. 1 should light.

e. Press the TEST KEY, located on the front of the R-F Unit, and observe the CURRENT meter. A meter reading of 380-ma, within —5%, should be obtained. Release the TEST KEY.

f. Turn the circuit selector switch to the position designated FINAL AMP. GRID, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 50-ma, within —20%, should be obtained. Release the TEST KEY.

g. Turn the circuit selector switch to the position designated 3RD AMP. TOTAL, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 100-ma, within +50—20%, should be obtained. Release the TEST KEY.

h. Turn the circuit selector switch to 3RD AMP. GRID, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 3-ma, within ±65%, should be obtained. Release the TEST KEY.

i. Turn the circuit selector switch to 2ND AMP. TOTAL, press the TEST KEY, and observe the CURRENT meter. (See figures 2-3 and 2-4.) A meter reading of 20-ma, within +100-50%, should be obtained. Release the TEST KEY.

j. Turn the two position VOLTAGE switch to the position designated R.F. BIAS and observe the LOW VOLTAGE meter. (See figures 2-3 and 2-11.) A meter reading of 340-volts, within ±15%, should be obtained.

k. Observe the HIGH VOLTAGE meter. It should read 2500-volts within ±10%.

l. Dial number 5. The white pilot lamp designated CHANNEL NO. 1 should go out.

3-49. R-F UNIT NO. 2.

a. Refer to figure 2-11 and turn the six position CURRENT switch to CHAN. NO. 2.

b. Turn the circuit selector switch at the top of R-F Unit No. 2 to FINAL AMP. TOTAL.

c. Dial number 3. The white pilot lamp designated CHANNEL NO. 2 should light.

d. Perform operations e through i, paragraph 3-48.

e. Dial number 5. The white pilot lamp designated CHANNEL NO. 2 should go out.

3-50. R-F UNIT NO. 3.

a. Refer to figure 2-12 and turn the MICROPHONE INPUT switch to LINE 2.

b. Place the two position toggle switch, shown in figure 2-11, in the LINE 2 position and turn the six position CURRENT switch to CHAN. NO. 3.

c. Turn the circuit selector switch at the top of R-F Unit No. 3 to FINAL AMP. TOTAL.

d. Dial number 1. The white pilot lamp designated CHANNEL NO. 3 should light.

e. Perform operations e through i, paragraph 3-48.

f. Dial number 5. The white pilot light lamp designated CHANNEL NO. 3 should go out.

3-51. R-F UNIT NO. 4.

a. Refer to figure 2-11 and turn the six position CURRENT switch to CHAN. NO. 4.

b. Turn the circuit selector switch at the top of R-F Unit No. 4 to FINAL AMP. TOTAL.

c. Dial number 3. The white pilot lamp designated CHANNEL NO. 4 should light.

d. Perform operations e through i, paragraph 3-48.

e. Dial number 5. The white pilot lamp designated CHANNEL NO. 4 should go out.

3-52. MODULATOR NO. 1.

a. Turn the two position toggle switch, shown in figure 2-11, to LINE 1.

b. Refer to figure 2-12 and turn the MICROPHONE INPUT switch to LINE 1.

c. Turn the six position CURRENT switch to the MOD. 1 TOTAL position.

d. Insert plug PL-68, attached to microphone T-17, into the MICROPHONE jack shown in figure 2-12.

e. Dial number 2. The white pilot lamp designated CHANNEL NO. 1 should light.

f. Press the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 1 should light.

g. Speak into the microphone at normal voice level and observe the CURRENT meter. Current peaks of maximum 300-ma should be obtained. Adjust the MICROPHONE INPUT control (figure 2-12) accordingly.

h. Release the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 1 should go out.

i. Dial number 5. The white pilot lamp designated CHANNEL NO. 1 should go out.

3-53. MODULATOR NO. 2.

a. Turn the two position toggle switch, shown in figure 2-11, to LINE 2.

b. Refer to figure 2-12 and turn the MICROPHONE INPUT switch to LINE 2.

c. Turn the six position CURRENT switch to the MOD. 2 TOTAL position.

d. Dial number 2. The white pilot lamp designated CHANNEL NO. 3 should light.

e. Press the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 2 should light.

f. Speak into the microphone at normal voice level and observe the CURRENT meter. Current peaks of maximum 300-ma should be obtained. Adjust the MICROPHONE INPUT control (figure 2-12) accordingly.

g. Release the switch on the microphone handle. The red pilot lamp designated MODULATOR NO. 2 should go out.

h. Dial number 10. The blowers should stop and the white pilot lamp designated CHANNEL NO. 3 should go out.

3-54. REMOTE CONTROL.

3-55. GENERAL. Operating checks pertinent to remote control equipment must necessarily depend upon the control system employed. The following instructions are applicable to the systems shown in figure 2-7 and 2-9.

3-56. PREPARATORY ACTION BY THE TRANSMITTER OPERATOR.

a. Refer to figure 2-12. Place the two AUDIO INPUT switches in the ON position and turn the MICROPHONE INPUT switch to OFF.

b. Turn the six position CURRENT switch, shown in figure 2-11, to CHAN. NO. 1.

c. Turn the circuit selector switch at the top of each R-F Unit to FINAL AMP. TOTAL.

d. Inform the remote control operator, by telephone, that the transmitter is in readiness for operating checks.

3-57. R-F UNIT NO. 1.

a. Instruct the remote control operator to use Dial A (figures 2-7 and 2-9) and dial number 9. The blowers should start. Wait 30-seconds for the time delay relay to operate.

b. Instruct the remote control operator to dial number 1. The white pilot lamp designated CHANNEL NO. 1 should light.

c. Instruct the remote control operator to hold telegraph Key A (figures 2-7 and 2-9) closed. The CURRENT meter should read 380-ma within —5%.

d. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should "follow" the keying impulses.

e. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 1 pilot lamp should go out.

3-58. R-F UNIT NO. 2.

a. Turn the CURRENT switch to CHAN. NO. 2.

b. Instruct the remote control operator to use Dial A (figures 2-7 and 2-9) and dial number 3. The white pilot lamp designated CHANNEL NO. 2 should light.

c. Perform operations c and d, paragraph 3-57.

d. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 2 pilot lamp should go out.

3-59. R-F UNIT NO. 3.

a. Turn the CURRENT switch to CHAN. NO. 3.

b. Instruct the remote control operator to use Dial B (figures 2-7 and 2-9) and dial number 1. The white pilot lamp designated CHANNEL NO. 3 should light.

c. Instruct the remote control operator to hold telegraph Key B (figures 2-7 and 2-9) closed. The CURRENT meter should read 380-ma within —5%.

d. Instruct the remote control operator to key the transmitter by sending a short series of V's. The CURRENT meter should "follow" the keying impulses.

e. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 3 pilot lamp should go out.

3-60. R-F UNIT NO. 4.

a. Turn the CURRENT switch to CHAN. NO. 4.

b. Instruct the remote control operator to use Dial B (figures 2-7 and 2-9) and dial number 3. The white pilot lamp designated CHANNEL NO. 4 should light.

c. Perform operations c and d, paragraph 3-59.

d. Instruct the remote control operator to release the telegraph key and dial number 5. The white CHANNEL NO. 4 pilot lamp should go out.

3-61. MODULATOR UNIT NO. 1.

a. Turn the CURRENT switch to MOD. 1 TOTAL.

b. Instruct the remote control operator to use Dial A (figures 2-7 and 2-9) and dial number 2. The white CHANNEL NO. 1 pilot lamp should light.

c. Instruct the remote control operator to grasp Microphone A (figures 2-7 and 2-9) and press the microphone switch. The red MODULATOR NO. 1 pilot lamp should light.

d. Instruct the remote control operator to speak into the microphone and make a short test transmission. The CURRENT meter should read maximum 300-ma on voice peaks.

e. Instruct the remote control operator to release the microphone switch and dial number 5. The pilot lamps designated CHANNEL NO. 1 and MODULATOR NO. 1 should go out.

3-62. MODULATOR UNIT NO. 2.

a. Turn the CURRENT switch to MOD. 2 TOTAL.

b. Instruct the remote control operator to use Dial B (figures 2-7 and 2-9) and dial number 2. The white CHANNEL NO. 3 pilot lamp should light.

c. Instruct the remote control operator to grasp Microphone B (figures 2-7 and 2-9) and press the microphone switch. The red MODULATOR NO. 2 pilot lamp should light.

d. Instruct the remote control operator to speak into the microphone and make a short test transmission. The CURRENT meter should read maximum 300-ma on voice peaks.

e. Instruct the remote control operator to release the microphone and dial number 10. The blowers should stop and the red and white pilot lamps, designated MODULATOR NO. 2 and CHANNEL NO. 3 respectively, should go out.

SECTION IV
EMERGENCY OPERATION AND REPAIR

4-1. GENERAL. Radio Transmitter Models 99A and 99C consist of a number of self-contained units which can be disconnected and removed from the cabinet without difficulty. For this reason, whenever malfunction occurs in any of the units, the faulty unit should be removed and replaced with a unit which has been tested and is known to be in good operating condition. The defective unit can then be forwarded to a designated repair base for a complete maintenance check and repair.

4-2. In the event one or two of the R-f Units should fail, the defective unit(s) should be removed from the cabinet compartment(s). The interlock shorting plug, shown in figure 1-10, is then inserted in the receptacle located at the rear and inside the vacated compartment. The interlock shorting plug is used to by-pass the interlock circuit incorporated in each R-f Unit and makes possible continued operation of the R-f Units remaining in the transmitter. Two interlock shorting plugs are provided for this purpose.

4-3. The test cable, shown in figure 1-10, is used to bench test an R-f Unit after it has been removed from the cabinet compartment. All power required for bench test can be obtained from the transmitter assembly by connecting the test cable to the receptacle located inside the cabinet compartment. The opposite end of the test cable is connected to the receptacle on the rear panel of the R-f Unit.

4-4. FUSE REPLACEMENT. The location of all fuses incorporated in Radio Transmitter Model 99A is shown in figures 1-7 and 4-1. The location of all fuses incorporated in Radio Transmitter Model 99C is shown in figures 1-7 and 4-2. The proper rating of each fuse shown in figures 4-1 and 4-2 is clearly stamped on the fuse panels. The rating of the fuse shown in figure 1-7 is stamped on the side of the fuse. Examine each fuse carefully before replacement. Make sure the rating and the type number of the replacement agree with the rating and type number stamped on the fuse to be discarded.

4-5. PILOT LAMP REPLACEMENT. The location of all pilot lamps is shown in figures 4-1 and 4-2. Removal is accomplished by pulling the colored lens from its compression holder and withdrawing the pilot lamp from the slide type socket.

4-6. VACUUM TUBE REPLACEMENT. The location of each vacuum tube used in Radio Transmitter Models 99A and 99C is shown in figures 4-3, 4-4, and 4-5. Tubes must be removed and inserted with care to avoid damaging any adjacent parts.

WARNING

Make certain the power is off before removing or replacing any tube.

Note

The most reliable method for determining whether tubes are in good condition is to replace the tube with a new tube and check operation of the equipment.

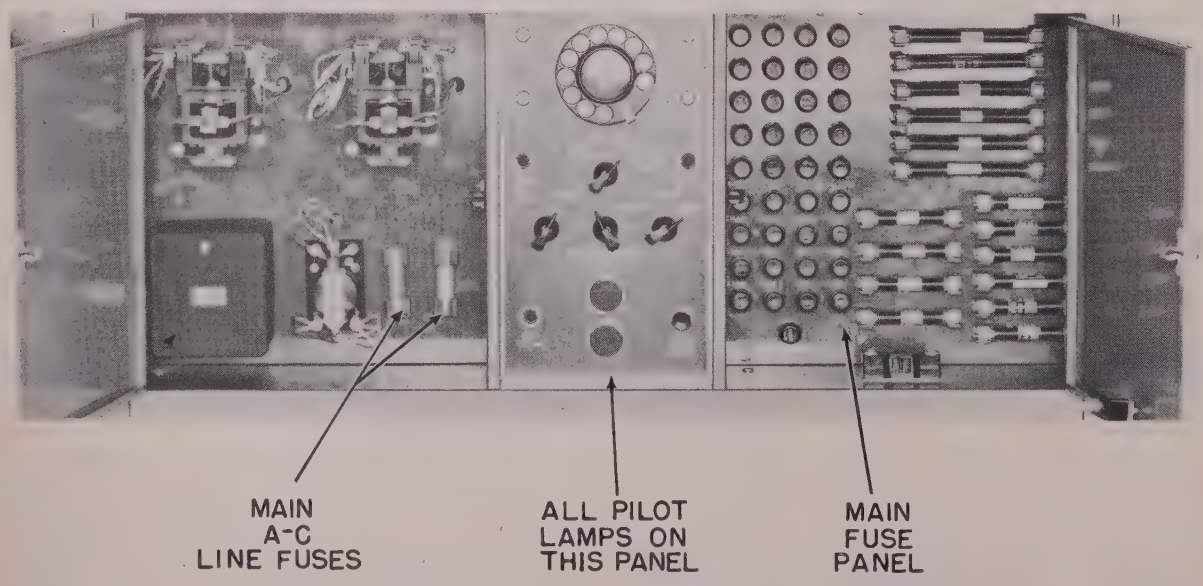

Figure 4-1. Pilot Lamp and Fuse Panels, Radio Transmitter Model 99A

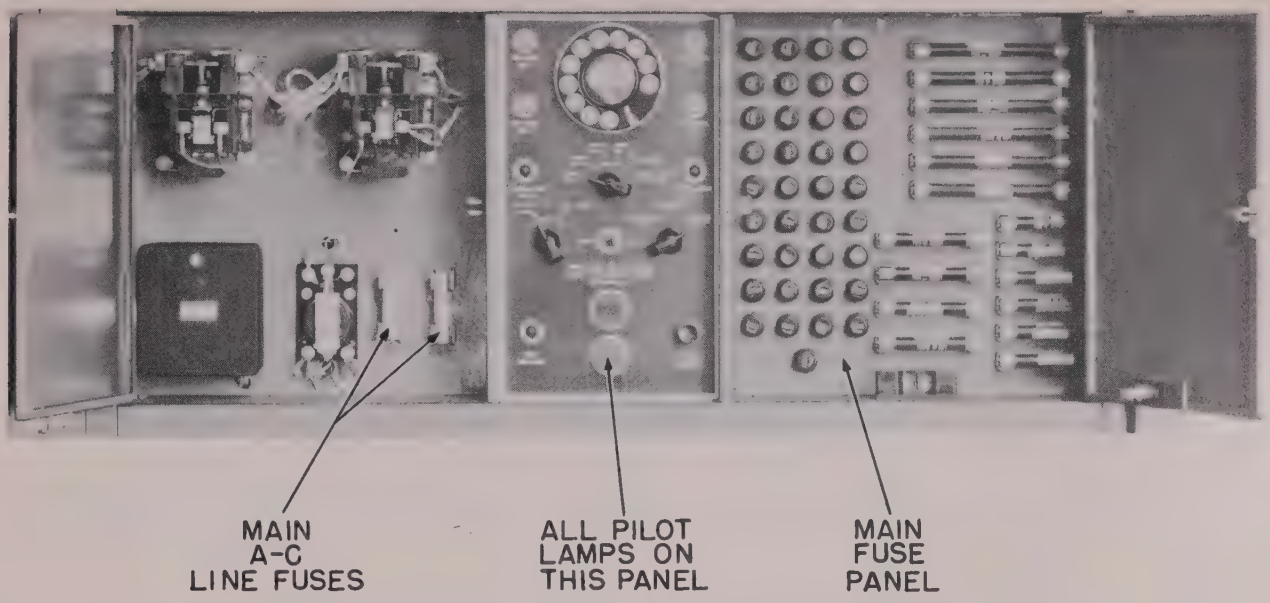

Figure 4-2. Pilot Lamp and Fuse Panels, Radio Transmitter Model 99C

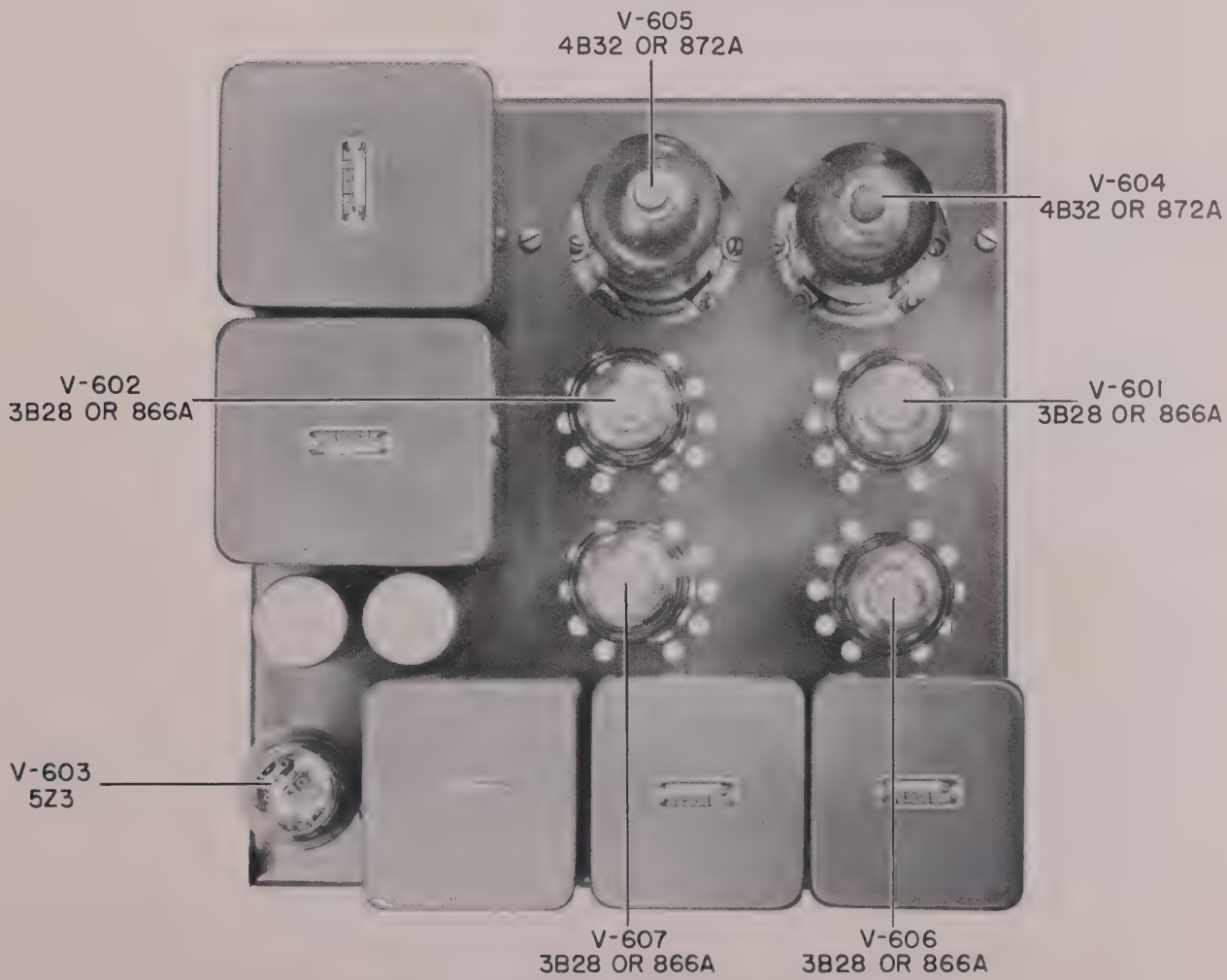

Figure 4-3. Rectifier Unit Type 95340, Location of Tubes

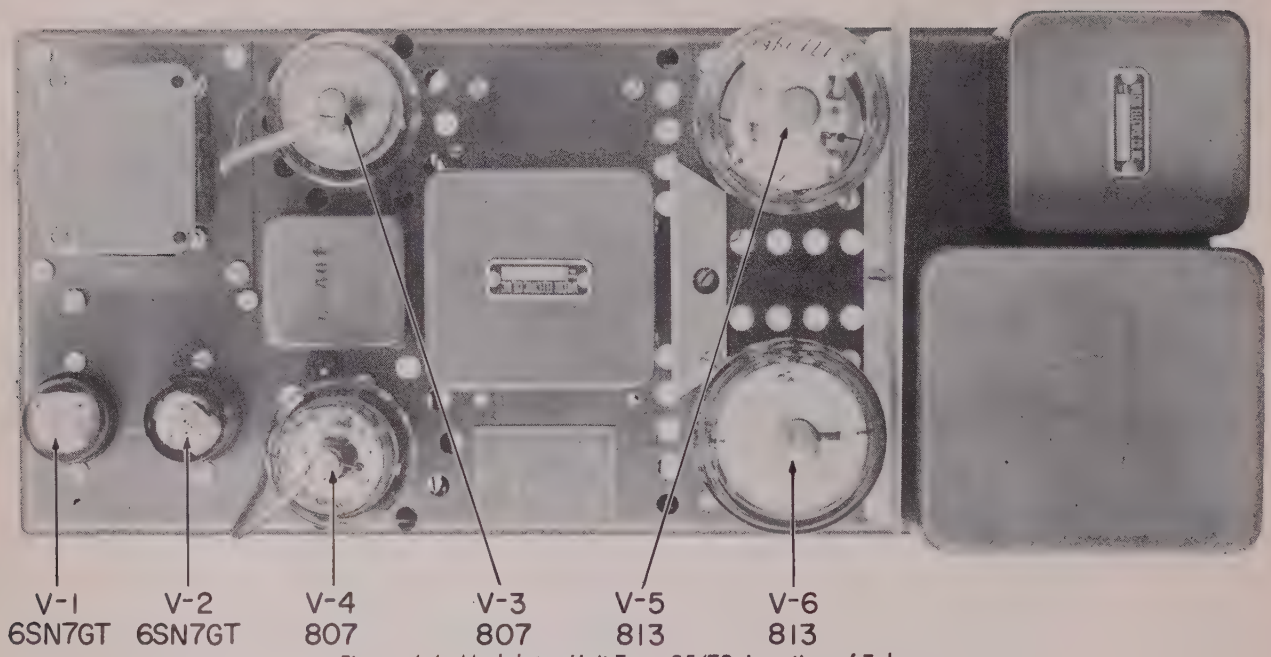

Figure 4-4. Modulator Unit Type 95479, Location of Tubes

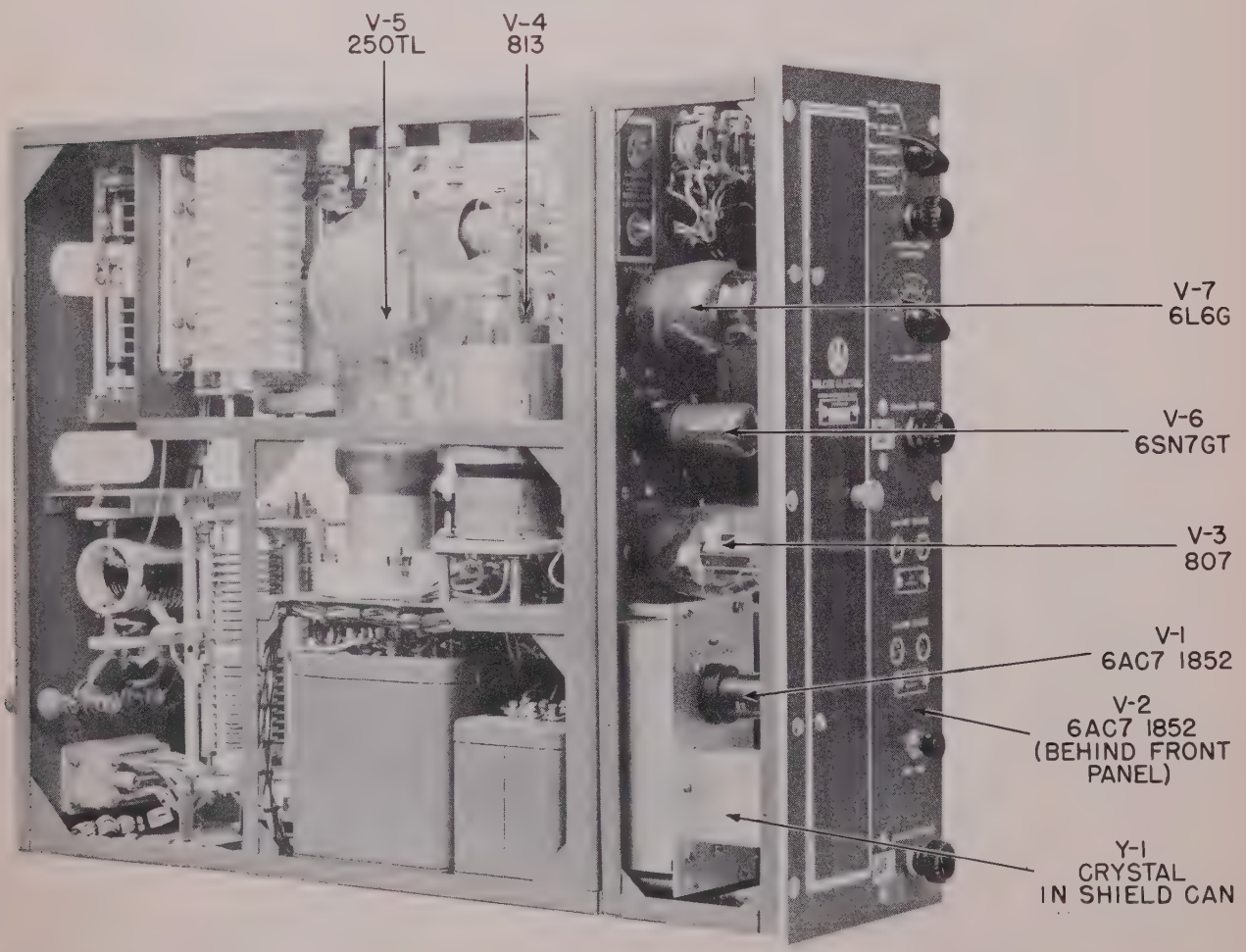

Figure 4-5. R-F Unit Type 95415B and Type 95415C, Location of Tubes and Crystal